NEW ZEALAND
JOURNAL OF
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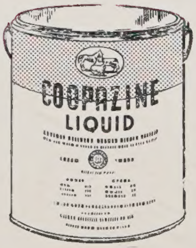

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This Month's Cover

Societies for the promotion of agricultural shows were formed in the early days of settlement of New Zealand, and the interest in these annual fixtures expanded rapidly with the rapid development of the Dominion's farming industry. Despite the relatively great growth of urban population and the considerable measure of industrialisation in the last 30 years, the shows hold their place in popular favour. This month's cover, which has been reproduced from an Ektachrome (Kodak (N.Z.) Ltd.) colour photograph by Sparrow Industrial Pictures Ltd., is of a scene during the grand parade at last year's Royal Show at Auckland. This year the Royal Show is being held at the Tomoana Showgrounds, Hastings.

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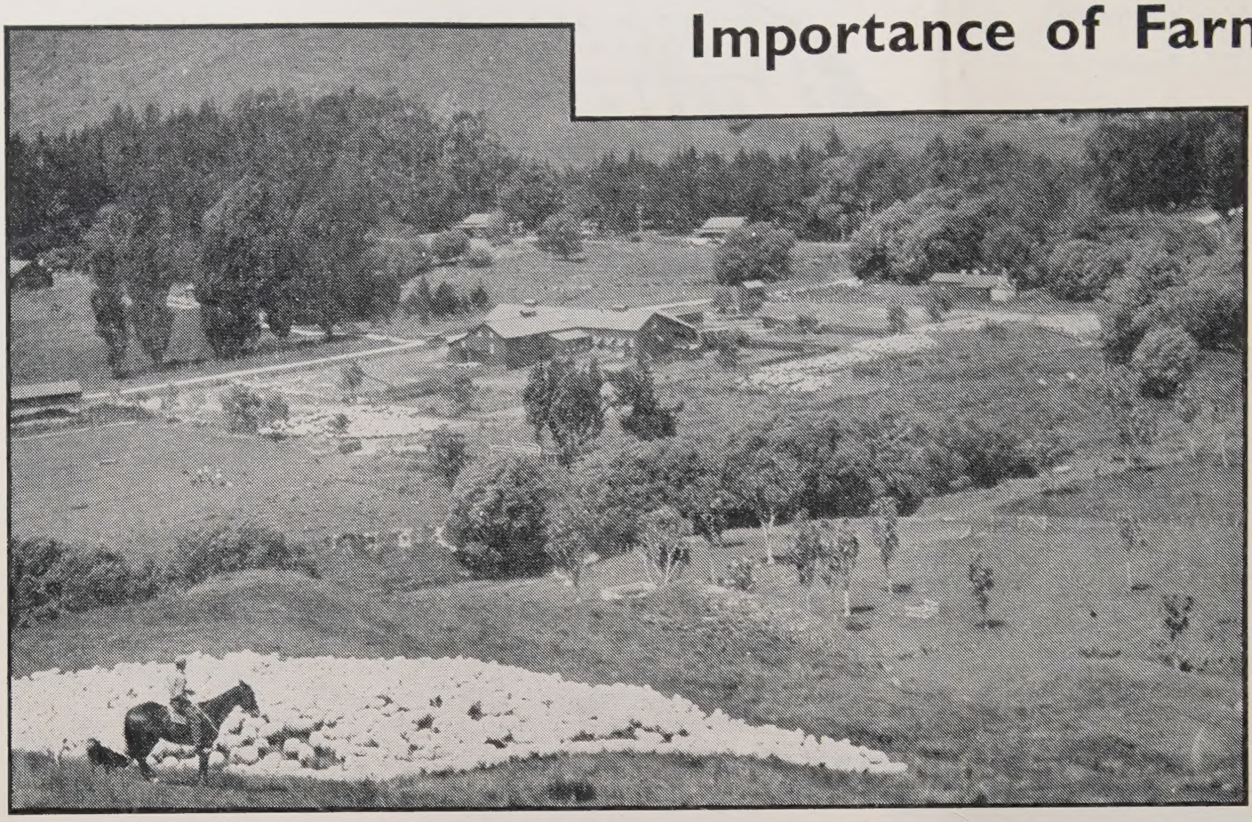
Importance of Farm



DURING the past 50 years New Zealand has established a large and important wool industry. During the same period wool manufacturers have made great progress in their sphere, particularly in dyeing and production of modern fabrics. Advances in sheep breeding and the processing and manufacturing of wool make it relevant to ask how much wool handling in farm woolsheds has improved over the same period. An honest answer to that question should give considerable food for thought to many wool growers. In this article R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings, refers to some of the more important shearing shed problems which bear on New Zealand's future as one of the world's leading producers of crossbred wool.

THE standard of preparing fleece wools, lambs' wool, crutchings, and skirtings in farm woolsheds appears to fluctuate a little from district to district. In some districts the workmanship is considered better than in others, but there is no district that could not improve the existing standards.

Reclassing and Binning

The breeding of sheep and the handling and marketing of wool have changed considerably in less than 50 years and a major factor influencing present woolshed workmanship is the change that has taken place in the general method of preparing clips for sale. Since the 1916-1920 "commandeer" period binning and reclassing by wool brokers at their wool stores rapidly increased in volume, until in many centres over two-thirds of the district's wool goes through the broker's reclass or bins. The swing from classing on the farms to reclassing and binning in brokers' stores is becoming more pronounced each season, and unless the grower prepares his wool efficiently at shearing time the handling of such a vast amount of wool in brokers' stores in the limited time between wool sales could become a bottleneck in the movement of wool, with serious disadvantage to all.

The bin and reclass systems received their main impetus during the 1916-1920 commandeer period, when mixed bales were put aside for sorting and grouping and then rebaled in even lots to aid valuations.

Reclassing and binning have grown beyond all expectations, from the handling of odd lots to the preparation of entire clips. The scope widened with experience and the passing of time, until today most clips are classed in brokers' stores. Thus the day of the country classer appears to be on the wane, mainly because of the trade demand for specialised classing of good wool and the concentration of expert classers at wool centres.

Critical Need

As the importance of the country classer diminishes, the importance of qualified supervision and the training of qualified and efficient shed hands must grow. A critical need in wool-growing districts at shearing time is for knowledgeable supervision and for good fleecos and table hands who know their jobs.

In woolsheds at shearing time there is an understandable bustle to get the job done, but far too often the standard of workmanship in fleece handling and skirting, the separation of pieces, neck wools, and stains, and the sorting of lambs' wool and crutchings is far below what could reasonably be expected.

The Sheep and Wool Section of the Department of Agriculture is continually trying to rectify the shortage of top-grade shed hands by instructional field days and woolshed demonstrations, but the seriousness of the position requires the attention of every wool grower. Casual shed hands are not always particularly interested in instruction, but members of Federated Farmers and Young Farmers' Clubs are, and herein probably lies the answer to a very acute problem; farmers and their sons should realise that woolshed work at shearing time must move with the times and adjust itself to trade requirements.

Good-style fleece wool must be correctly handled, skirted with common sense, properly rolled and pressed, and the contents correctly marked on the packs. Stained wool and other odd lots that will not match or those that will not dye evenly must be correctly separated. Necks, bellies, pieces, lambs' wool, and crutchings must be correctly prepared in farm woolsheds if more and more wool is to be handled in brokers' stores.

HEADING PHOTOGRAPH: The shearing muster should be over clean country. Road droving should be avoided.

Woolshed Workmanship

Causes of Unsatisfactory Work

The following are causes of unsatisfactory woolshed work:—

The man in charge not being aware of the requirements of his job.

Unsupervised casual labour.

Faulty wool table and lack of facilities.

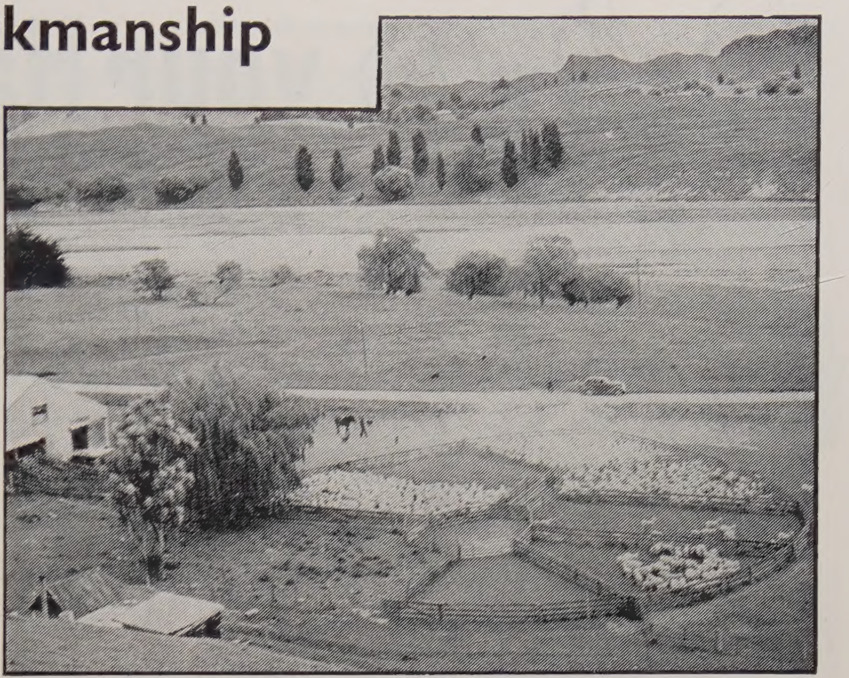
Cramped, badly lit, or dirty working conditions.

Shortage of labour.

Inability of owner to delegate competent authority.

Farmers can no longer expect casual hands to carry the responsibility of preparing their wool clips and they cannot wait until shearing time and expect to get experienced hands at short notice. The grower or his responsible agent must be in the woolshed throughout shearing; he must accept responsibility and be able to instruct and supervise his casual labour in preparing the clip as he wants it done and as it should be done.

Brokers cannot be expected to waste the time of expert staff in attempting to hand pick lots that should never have been mixed or by trying to rectify bad skirting after the wool has been rolled, pressed, and become cold. Good wool requires intelligent handling in the shearing shed when it is freshly shorn and before it is pressed. Faulty skirting is exaggerated once fleeces are pressed; heavy-conditioned points squeezed into good wool mar bloom and colour; stained wool is often damp and therefore harmful to surrounding clean wool; dust and dirt are exaggerated, and colour deteriorates.



Above—Pre-shearing drafting eases handling problems in the wool room. Wet ewes, dry ewes, wethers, hoggets, lambs, and rams should be shorn separately. Below—A clean shearing board is essential to the production of clean, bright wool.

[*National Publicity Studios photo.*

Shed and Yard Hygiene

Clean, healthy conditions about the woolshed and yards are essential to the best presentation of good wool. Splintered rails, pieces of wire, dip packets, broken gateways and floor battens, and other such hazards should all be attended to before shearing time. The woolshed floor, tables, and comb and cutter tins should all be scrubbed and scrupulously clean.

When the shearers arrive and unwrap handpieces, combs, and cutters that have probably passed through all sorts of conditions they should find a strong solution of washing soda and clean water on the board and they should be requested to scrub all gear. This precaution may prevent a spread of infection from shed to shed and it will usually save greasy combs and cutters from ruining the new grinding papers.

Shearing Muster

Sheep should be mustered over the cleanest possible country. Wherever possible road droving with its consequential dust damage and general loss of bloom should be avoided. Growers seldom realise this loss of colour until they have the opportunity to compare their clip with a comparatively dust-free, bright line. Admittedly much of the dust and foreign matter in some wool clips is not all collected at shearing time, but many clips otherwise of good colour are seriously depreciated

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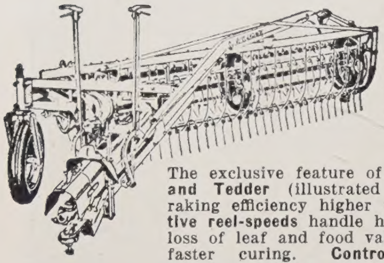

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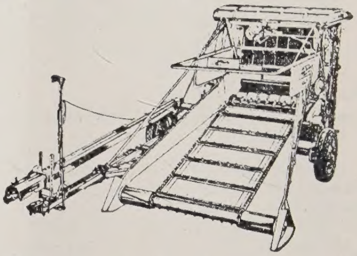

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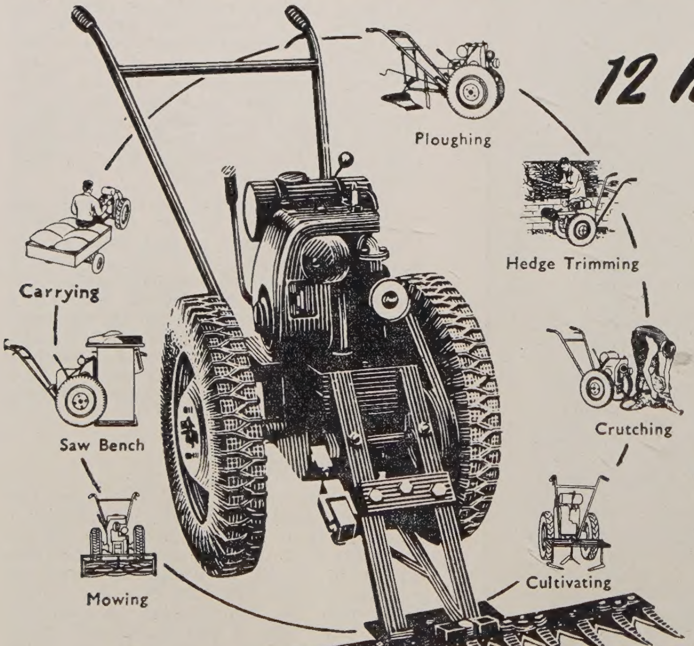

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by road droving and dirty or dusty yards. One property showed a 12 per cent. depreciation in wool values because of road droving and dusty holding paddocks and yards.

Drafting

Drafting is another important factor in economy of shed labour. Wet ewes, dry ewes, wethers, hoggets, lambs, and rams should all be drafted and shorn separately. Pieces, bellies, and necks from hoggets are generally much finer in quality than similar wool from older sheep and warrant separation. A few wethers shorn with ewes can depreciate a whole bale or line of bellies unless the urine stains have been removed from the wether bellies, and that is seldom done where sexes are shorn mixed. If mixed sexes and ages go over the board together, more facilities and much more space are required than the average woolshed can provide. Apart from this, it is almost impossible in the bustle of shearing time for even an experienced classer or shed-hand to give mixed lots the attention they warrant.

Black or partly-black sheep should be drafted off to be shorn last or, where that is awkward, the shearers should be asked to leave them until the end of a run to give the shed-hands time to clean up and keep all pigmented wool separate.

A broker's binning section, where quick, efficient handling depends so much on previous good woolshed workmanship. Faulty handling in farm woolsheds cannot be fully rectified here, but efficient shed work allows for better and faster handling. In this bin room the full bins are picked up on the truck in foreground and conveyed to the press.

Dagging

Dagging, wherever necessary, must be thorough if clean, bright wool is to pass over the shearing board and wool table. Where large numbers are to be dagged the sheep can be drafted off, and the dagging done efficiently on the shearing board before shearing, in a manner similar to fly crutching. This method has the advantage that it can be done under clean conditions and there is no waste. With smaller flocks odd dirty sheep can be done in a clean pen or yard, but cleanliness is essential for clean, bright fleece wool; if sheep are turned over in a dirty yard, they pick up unnecessary dirt and dust. If a few sheep require dagging before entering the shed, some farmers may prefer to dag standing sheep and so avoid sitting full-woolled sheep in dust or dirt. Dagging standing sheep is easier than many farmers realise.

Staff Supervision

The fairly common misapprehension that marking a clip either bin or reclass is the solution to all woolshed problems and that the broker will sort everything out is responsible for considerable inconvenience to brokers and financial loss to many wool growers. Slovenly or careless shed work cannot be rectified fully by later expert attention in a broker's reclass or bin.

Wool Table

One of the commonest faults in farm woolsheds is an unsuitable or badly placed wool table. A good wool table should be big enough to take the average fleece spread out evenly on the battens; small wool tables allow fleeces to droop over the sides, and these, even with good hands, encourage skimped skirting in some places and excessive skirting in others.

Pre-shearing yarding work in dusty yards. Loss of colour through road droving and drafting in dusty yards cost the owner of these sheep 12 per cent. of his wool cheque.

A general measurement for New Zealand wool tables is 9ft. long, 4ft. wide, and 3ft. high, but those measurements may require adjustment to specific districts, an example being Hawkes Bay, where most of the fleecos are Maori girls, and there a good wool table for average crossbred fleeces is 8ft. 6in. long, 4ft. 6in. wide, and 2ft. 9in. high, with at least 1in. between the battens.

Many wool tables are too small, many are jammed up against a wall, and many have the battens so close together that second cuts and fribbs cannot be poked through. If battens are too close together, their purpose of shedding second cuts and small, heavy-conditioned pieces is defeated. A good wool table should wherever possible be accessible from all sides. The table against the wall has a disadvantage in that the skirter must fold the far side of the fleece back and skirt across the fleece, dropping fribby bits and second cuts into the centre of the fleece.

Skirting

Experienced table hands know where to skirt and what to do with the pieces, but where "green" hands are employed it is safer to instruct them not to skirt odd fleeces that are very burry, dirty, black, or cotted, but to place them in a separate lot. Skirtings if taken from such fleeces are seldom kept separate; they are usually tossed in with good piece lines. Dirty, seedy, or cotted points will depreciate better-piece bins.

A little burr in otherwise free pieces can depreciate the whole line to a burr grade and thus deter a buyer seeking free lines. Some farmers fail to appreciate the value of good skirting, but

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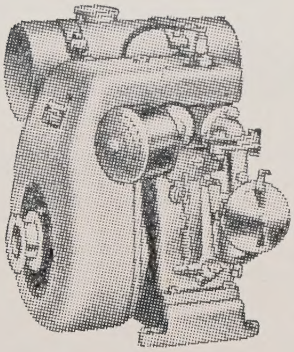

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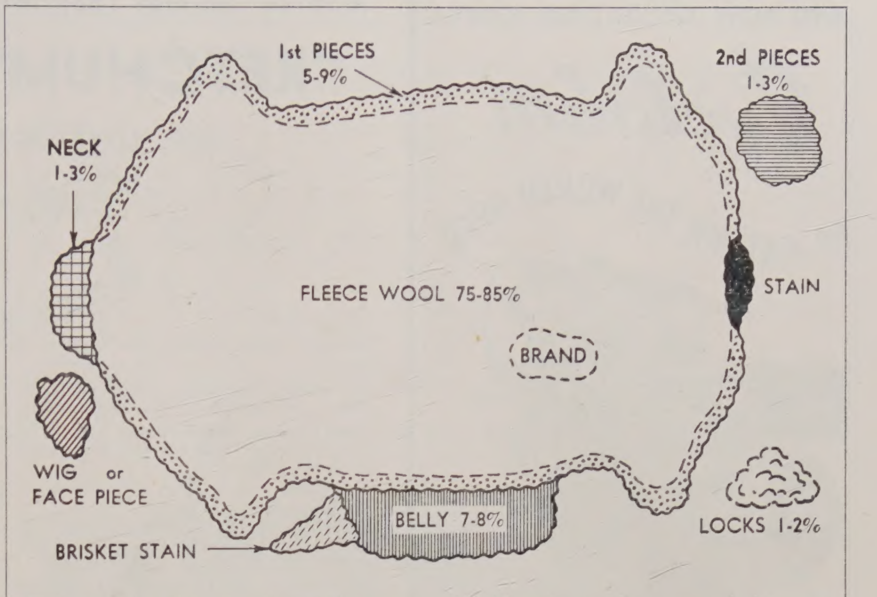
a point often overlooked is that though low-grade, off-colour wools may not warrant more than limited skirting, the importance of good skirting increases proportionately with better-style wools.

There are many rules for skirting, but some of them when applied dogmatically give indifferent results. Skirting rules must be applied with common sense, and a good all-purpose rule is to take off as little as possible to leave a clean, uniform fleece.

In an average shed the greatest attribute to good skirting is ordinary common sense. Where the fleeces do not show a hard or hairy britch there is no point in making forequarter and hindquarter pieces, because the slight quality range that would result would not be significant and normally would not increase the value. If flocks have a distinctly hard or hairy britch, common sense suggests a britch line. Pride at having secured top price for pieces is usually misplaced satisfaction, because normally it is an indication that good fleeces have been robbed by over-skirting.



Skirtings. The diagram shows the range of oddments usually removed from an average crossbred fleece and those that should be packed separately in the farm woolshed at shearing. Skirting should be thorough, but no deeper than necessary. All odd or dirty wool should be removed, but good, clean wool should not be robbed from the fleece. From a normal flock pieces skirted from the fleece can be first pieces; second pieces are those pieces between first pieces and locks and are usually composed of odd pieces from about the britch and pieces from the floor and from under the table that are too good for locks. Skirting hindquarter pieces as second pieces is not warranted unless the flock is particularly britchy. Where separate lines of forequarter and hindquarter pieces are made from an average flock the slight difference in quality range does not normally alter valuation.

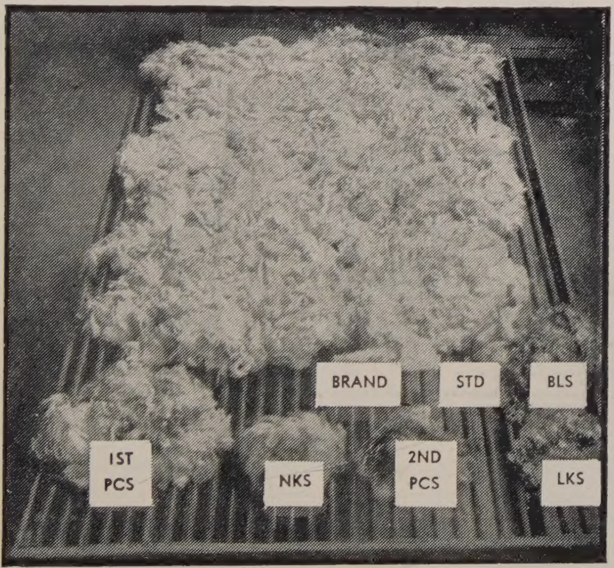
First Pieces

First pieces need not be big pieces and should not be confused with broken fleece. Heavy-handed skirters should be checked, because as much good clean wool as possible should be left on the fleece, provided it is of the same general quality as that of the fleece.

A common form of bad skirting is the removal of good-sized pieces from some parts of the fleece and the leaving of small, heavy-conditioned pieces and stains on other parts. Where unsuitable tables are used large fleeces will overlap and, if the wool tends to be of an open type, big sections may fall off or come off in the skirter's hands, though he intended only to trim.

Second Pieces

Second pieces are the small, heavy-conditioned, or odd pieces and unstained crutch trimmings plus the larger pieces shaken from the locks and from about the floor.



Typical crossbred fleece on a good wool table. Note the spacing of the battens. The marked oddments show the normal skirtings from a crossbred fleece: First pieces (1st PCS), necks (NKS), second pieces (2nd PCS), bellies (BLS), locks (LKS), stained pieces (STD), and brand.

Necks

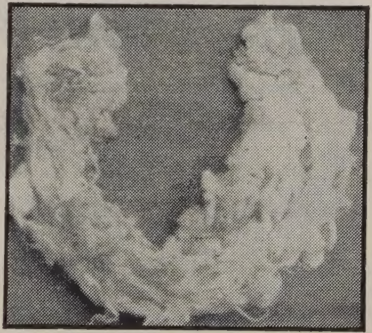
The removal of neck wool should receive much more consideration than is usual. The neck is a collar piece and it is this fold alone that should go into the neck bin. The average neck should weigh about 1½ oz. Shoulder wool is usually the best part of the fleece and should not be removed unnecessarily. Taking off good shoulder wool with the neck merely depreciates the fleece; it is one of the most common faults of heavy-handed or careless skirters, and growers should give this point particular attention. Hogget necks are usually finer than neck wool from older sheep, and even if it means sending a small lot to the broker's bin, these should be packed separately.

Brands and Black Wool

Brands should be removed at skirting and forwarded to brokers as brands. As branded wool should be scourable, those pieces should not be mixed with stains. "Black" wool, whether in the form of a small grey, brown, or black spot or large patch, should be left in and the whole fleece put aside as black wool. A black, grey, or brown spot usually means further pigmentation (coloured fibres) throughout the fleece, and wool of that nature may not interest buyers with orders for wool suitable for manufacturing into light, pastel materials.

Stained Pieces

The provision of a container to take stained pieces, including those marked by phenothiazine and bluestone, is important and, if a basket or other



Neck fold from an average crossbred fleece, weighing 1½ to 2oz.

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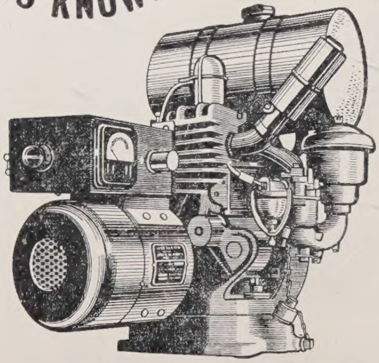

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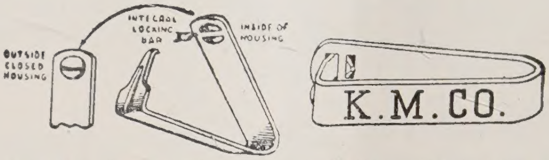

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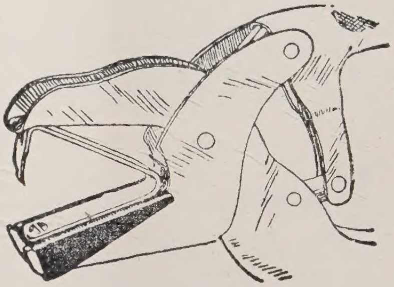

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container is conveniently placed, the board and table hands will usually dispose of all stains promptly and efficiently. Facilities for dealing with stained pieces are often either inadequate or omitted, and therefore these depreciating pieces are often neglected and allowed to pass and to mar other lines.

Stained pieces are often damp, and if pressed attached to bellies or with clean locks, pieces, or crutchings, contaminate much good wool.

Bellies

Bellies often receive less attention than they warrant. In many woolsheds they are mixed, ewes' with wethers' or adult sheeps' with hoggets', and that is bad practice. On larger properties where sheep come in from different blocks it is often advisable to consider wide contrasts in condition, such as free, light, or heavy seed, and divide lots where circumstances warrant it. The removal of stains from good bellies is important, and urine stains should always be removed. This should be noted by the farmer who carries a few wethers and shears them with his ewes, as many bales of bulk ewe bellies are depreciated a grade because a few wether bellies from which urine stains have not been removed have been included.

Neglect of stained brisket points and fribby ends depreciates many lines of otherwise good bellies. Correctly instructed fleecos will pick up the belly wool in such a way that a flick of the wrist will send the fribby or stained brisket point into the stained pieces line before the belly is tossed into its compartment. To deal satisfactorily with bellies it is possible in some sheds to build a platform above the catching pens on to which the fleecos toss the bellies, which are then out of the way. They can be picked over and sorted when the rush of shearing is over.

Locks

Good locks deserve attention and the lock bin or fadge should not be used for general discards. Good locks should not be depreciated by sweepings, dags, or stains.

Contents of Bales

Incorrect descriptive branding on bales sent into brokers' stores is general. "A" wool is frequently marked "B" or "C", bellies, pieces, lambs', or crutchings. These mistakes can cause much unnecessary rehandling or disruption of show stacks. Branding and numbering should be done by or supervised by a responsible person, as, apart from the unnecessary labour involved in reshuffling, bales of good-quality, high-priced wools can go under the auctioneer's hammer as inferior, low-priced lines.

Incorrect marking on bales can cause unnecessary differences between grower and broker, and the final correction is invariably embarrassing to the grower.

Eye Clippings

Eye clippings, which are also referred to as face pieces, wiggings, or topknots, should never be mixed with pieces, crutchings, or lambs' wool. These face pieces are usually fine, fluffy, kempy, and light conditioned, and are particularly undesirable mixed with good-quality lambs' wool, pieces,

SKIPS IN FARM WOOLSHEDS

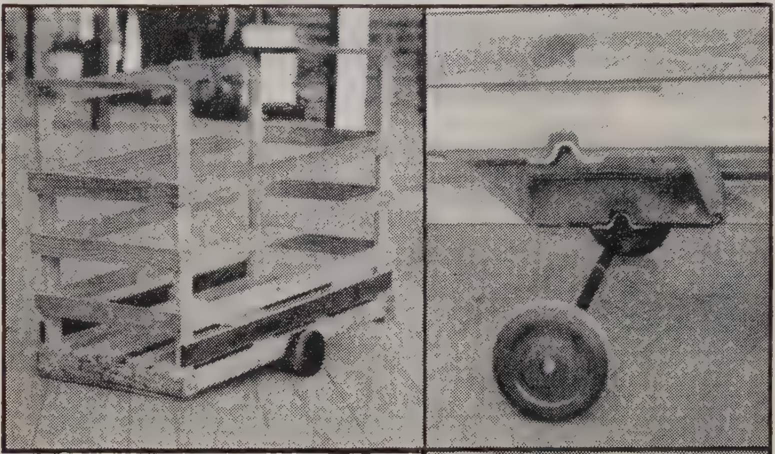
SKIPS could be used to advantage in many farm woolsheds for conveying wool, particularly oddments, to bins and later to the press. Their use prevents many mixed bales and much faulty pressing. Many mistakes are caused by putting all odd lines, such as first and second pieces, necks, bellies, stains, locks, face pieces, and others, in wool packs, as where too many are used the consequent assortment of fadges is often a nuisance and sometimes leads to trouble in the wool room.

Too often pressers leave the fadges to clutter up the room, because they are not sure of the contents or they merely guess to complete a bale.

Unnecessarily mixed bales are a serious fault in many clips, and for that reason alone the possibilities of using skips should be examined.

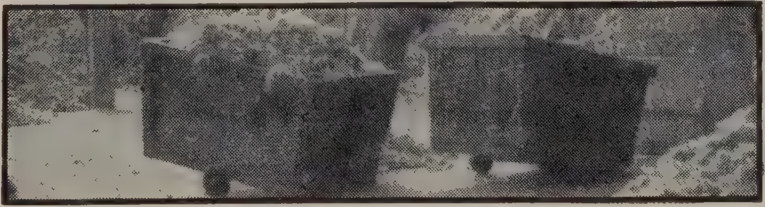
Skips are easily and quickly emptied into the respective bins, where the line is held until a complete bale is assembled. A skip is also very convenient for conveying wool from bins to press.

Skips may be made in hardboard, plywood (which is perhaps preferable), basket form, or with slats. Slat types are usually lined with scrim for handling locks, pieces, etc.



Above—A handy, slatted wool skip 2ft. x 4ft. easily made from 3in. x 1in. dressed timber. The axle is a ¾in. rod 2ft. 6in. long burred over at the ends after the rubber-tyred wheels are slipped on. The axle rests on simply made holders. Simplicity is the keynote of construction; the loose wheels on the free axle do not clog readily, and if they do, they can be freed easily and quickly. Where skips are made to a standard size the axle-wheel assembly is interchangeable. The skip is 3ft. high at both ends and one side; the other side is 2ft. 2in. to allow for easy emptying.

Right—Slatted skip lined with scrim. Below—Hardboard (left) and basket (right) skips.



Tidy woolshed ready for crutching. The raised shearing board is occupied by shearers only; shed-hands work from floor level.

or crutchings. Good staff on the board will seldom let face pieces reach the wool table, as they generally fall loose on to the board at shearing. These face pieces must be kept separate and later sent to the broker, who makes provision for these and other small lots of oddments.

Trade requirements of wools that will dye evenly are the reason for many odd lots of wool being separated. Wools that will not dye evenly have their uses and are often in keen demand for special purposes.

Lambs' Wool

In the past season good sorts of lambs' wool that had been well handled in the woolshed were in keen demand. Badly picked and inferior sorts met an easier market.

Many lines of lambs' wool were mixed in length and style, others carried brand marks, and some showed lack of sorting at shearing time. Other lines showed indiscriminate use of strong-woolled rams. Breeding to stronger-wool types means more than buying a very strong-woolled crossbred ram, and some of the lambs' wool suggested future trouble if this type of wool was from ewe lambs that might become breeders. If wool growers who lack breeding experience wish to strengthen their flocks, it would be good policy to discuss this matter with a studmaster.

Lambs' wool should always be sorted at shearing time. It cannot be satisfactorily sorted after being baled and pressed. At least the belly wool and shorts should be shaken out and where necessary any straight or steely britch wool separated to make a top line of the longest, brightest, and best. It is bad workmanship to mix on the shearing board wool that should never be mixed and then expect somebody to unravel it later. Lines unmixed subsequently, even by expert staff, are never as satisfactory as those separated in the shed.

Dead wool in filthy condition (it contains even parts of the skeleton) forwarded to a broker's store. Dead wool should be picked over before dispatch.

Crutchings

The best place to sort crutchings is on the shearing board in the woolshed, where odds, shorts, and stains may be fairly simply separated. Where sheep are wigged or cleared about the eyes the face pieces must be separated. In a small to average shed it will probably pay to shake out the shorts, off-colour, and stains and then allow the balance to make a bulk line. In larger sheds it is wise to consider style and quality before deciding on the lines to be made. Face pieces, shorts, and odds should be separated and then, where style, quantity, and quality warrant, make two lines of the balance, a medium-quality line and another line of the stronger quality, the latter taking nothing finer than 46's quality. Good-style, strong crutchings have been in particular demand and it is therefore policy to make that line where circumstances warrant.

Different types of wool have different uses; coarse crutchings may be sought by the carpet trade because they do not felt easily. Fine crutchings felt readily and are therefore more sought by the felting trades. Some important buying interests operating within quality limits cannot bid on crutchings which have face pieces included. A line of good crutchings in which eye trimmings are intermingled will not interest buyers prepared to pay extreme prices for suitable lines.

Handling of crutchings can often be considerably improved if the use of brooms is limited to responsible staff only. Good workmanship means handling the wool intelligently, not merely sweeping all sorts into a mixed heap for the classer to try to unravel. A broom in the hands of a trained shed-hand can mean efficiency, but in unskilled hands brooms are more often a menace.

Dead Wool

Dead wool should never be mixed with crutchings, even if it looks similar. Dead wool is plucked wool; it has a root bulb on each fibre, it will not dye evenly, and it has different uses.

Specification Sheet

The best check the grower has to confirm that his wool has been pressed and branded properly, then safely delivered into the broker's store, is a correctly completed specification sheet. Correct details allow for the speedy adjustment of branding errors and they also give the broker vital storage and stacking information.

It is in the grower's interest to complete this sheet, which is supplied by the broker, and forward it as soon as possible, preferably before his wool leaves the woolshed, but at latest with the wool. It should state whether that particular consignment completes the line or the approximate number of bales to follow. The specification sheet should be made out by the owner or his responsible agent in the woolshed, but not by pressers. Where pressers are allowed to make out specification sheets branding errors are likely to be duplicated.

Full instructions to the broker should be given in writing and telephone messages should be confirmed in writing.

Ryecorn in Otago

By S. M. J. STOCKDILL, Fields Instructor, Department of Agriculture, Dunedin

RYECORN, which was introduced into New Zealand many years ago to provide grain and material for thatching, is probably the most versatile of greenfeed crops. It will provide supplementary feed at almost any period of the year on high- or low-fertility soils under a wide range of climatic conditions and can fill a useful place in rotations of most sheep and mixed-cropping farms and to a less extent on dairy farms. This article discusses the growing and utilisation of ryecorn as greenfeed and the harvesting of it for seed in Otago.

RYECORN (*Secale cereale*) is the cultivated form of a wild perennial species (*Secale montanum*), which occurs naturally in the more elevated areas of the eastern Mediterranean region and in the east to central Asia.

Cultivation of ryecorn is recorded in the early history of many European peoples, and as recently as 200 years ago it formed the general food of one-seventh of the British population. Rye was then the principal bread grain of all European countries, but it has largely been replaced by wheat in recent times, and heavy consumption of rye bread is now confined to Scandinavia, to parts of northern Germany, and to Russia. Its continued use in these areas can be attributed to the ability of ryecorn to survive under climatic conditions too rigorous and soil conditions too poor for the growth and maturity of wheat.

Rye has always been utilised principally for human consumption, but considerable quantities are also fed to stock, mainly in Europe. Its popularity as a grain fodder is, however, limited by its poor palatability and the fact that as grain it tends to cause digestive troubles if not fed judiciously. In addition rye is used in Britain, America, and Australia for greenfeed and in the last-named country also as a pioneer plant in the stabilisation of drifting sand country.

Rye straw, which is extremely tough and fibrous, is used in the hatmaking and papermaking industries, as well as for thatching, packing, and the bedding down of housed stock. It is of very little value as fodder.

Early Use in New Zealand

Although the precise date that ryecorn was introduced into New Zealand is somewhat obscure, it was first mentioned in statistical returns in 1874, and was probably introduced some years before that.

As a grain crop for human consumption ryecorn has never been of importance in New Zealand. It is recorded as being grown fairly extensively many years ago in the Arrowtown and Shotover districts of Central Otago, where the grain was either sold or fed to stock and the straw used for thatching. In the early part of this century it was also grown in the Waikato to provide material for thatching. It was estimated that ½ acre of ryecorn would provide sufficient material to thatch the stacks from approximately 20 acres of crop. The ryecorn was grown on small patches of poor land and was cut at the flowering stage when the straw was tough but not brittle and when the grain had not formed.

Ryecorn as Greenfeed

Thatching of stacks is practically a thing of the past and ryecorn has now assumed a new and much more important role in New Zealand agriculture—that of supplying greenfeed for stock during periods of pasture shortage. The graph on page 285 illustrates the rapidly increasing area devoted to this crop in Otago during the last 8 years and the table on page 286 shows the distribution of ryecorn in Otago for the 1948-49 season.

Characteristics of the Plant

The ryecorn plant is a cereal very similar to wheat in its general agronomic features. It is capable of much more rapid growth than wheat in the early stages and is characterised by its vigorous stooling and prostrate early growth. The first leaf to appear is typically reddish and inclined to be spindly. When the plant stools out the leaf sheaths also bear this reddish coloration and the leaves tend to curl along their length.

The early, lush green growth of ryecorn is a most palatable, nutritious, and trouble-free feed for all types of stock, but as the crop approaches maturity it takes on a greyish green appearance not common to other cereals and simultaneously becomes tougher and less palatable.

The straw of ryecorn is much tougher and more fibrous than that of wheat and the seed head, which is more open and longer, bears a very dense and harsh beard. The grain is smaller but longer in proportion to its width than wheat, with a rougher skin. A deep crease which is very closely

HEADING PHOTOGRAPH: Ryecorn saved for grain, Wanaka, Central Otago.

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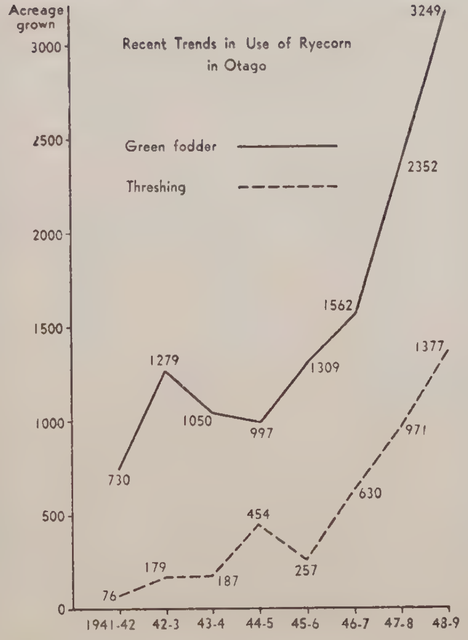
Sheep grazing at Outram.

pressed makes it appear to be shallow. The colour of the grain is closely related to the variety or strain and may be of varying shades of green, yellow, and brown.

The ryecorn plant, unlike wheat and other cereals, is mainly cross-pollinated and almost self-sterile. This is because pollen is not liberated from the ryecorn anthers until they have protruded from the glumes, at which stage the stigmas of the parent florets are not readily fertilised. In addition with ryecorn the entire head of florets opens simultaneously, not gradually over a period as is typical of other grains.

Consequently to produce seed the ryecorn plant is dependent on fertilisation by pollen, transported mainly by wind, from other ryecorn plants. Ryecorn therefore depends to a much greater extent than other cereals on suitable weather at flowering time to ensure a good setting of seed and in turn a good yield. Strong, dry winds tend to desiccate the pollen and moist conditions with moderate winds are probably best.



Much more important, however, is the effect of cross-pollination on the development and maintenance of selected improved strains. For a ryecorn plant to breed true to type it must be fertilised with pollen from a plant bearing identical inherent qualities. Thus, unless subjected to very careful initial selection and subsequent rigid isolation, improved strains may quickly lose their special qualities and revert to those of the poorer, unthrifty, low-producing types common to the district in which they are grown.

This tendency to deteriorate through cross-pollination is much greater with ryecorn than with the other cereals wheat, oats, and barley, which are readily self-fertilised, and it would appear to be an explanation of the low production of most of the ryecorns available commercially.

Some success has recently been achieved by plant breeders at Svalof in Sweden in the isolation of self-fertile strains and this material will probably form the nucleus of future commercial varieties which should retain their characteristics more permanently.

BELOW—Windrowed ryecorn, Lagoon Valley, Central Otago.

Diseases

Ryecorn is affected by most of the diseases common to other cereals, but, with the exception of ergot, to a much less and almost insignificant degree.

Ergot, which is characterised by large, purplish-black bodies which replace the grain in the seed head, is a fungous disease which can cause considerable loss in crops of ryecorn saved for grain, but this disease can be avoided by sowing seed which is free of ergot bodies, and affected crops are uncommon. Ergot loses its viability if stored for 1 year and infected lines should be stored for that period before sowing to avoid further increase of the disease or they could be sown for greenfeed.

Leaf and stem rusts may cause damage under humid conditions, but serious attacks seldom occur and ryecorn can generally be regarded as a strongly disease-resistant crop.

Varieties Available

Until 1947 no distinct varieties were available in New Zealand and commercial lines, frequently described as "Emerald Rye", varied from low production to very low production, having mostly reverted to inferior seed-producing types which became stalky and shot away to seed at the slightest check in growth. These poor characteristics were largely responsible for the limited use of ryecorn as greenfeed.

In May 1947 the variety Svalof King II was introduced commercially and has since gained popularity in Otago owing to its high production of green fodder and its high seed-yielding ability. King II is a winter variety originating from the Svalof Research and Plant Breeding Station in Sweden, where it was bred and selected for its winter hardiness, broad, dense ears, short, stiff straw, and high yield of good-quality grain. It was first marketed there in 1939 and is now the predominant grain variety on the fertile soils of south-western Sweden, where it is sown in autumn and thrives under the prevailing cold winters and fairly high rainfall.

Despite its original selection as a grain-producing variety King II has proved itself in Otago as a high producer of good-quality greenfeed for both autumn and spring feeding. It is, however, unlikely that it will retain these qualities unless it is grown in isolation from inferior strains.

Certified N.I.A.B.

For some time the Crop Research Division of the Department of Scientific and Industrial Research, realising the importance of ryecorn as a winter and early-spring fodder, has been interested in the introduction and selection of more suitable types than those available commercially. As early as 1944 importations of winter ryecorns were made and included in these was a strain which had been developed by the National Institute of Agricultural Botany at Cambridge. This strain has since become known as N.I.A.B. winter ryecorn and has in the intervening years proved in trials to be capable of considerably higher production than the commercial strains which were previously available.

Seed stocks have therefore been multiplied as rapidly as possible under strict isolation, and certified Mother seed was released to growers for seed production last season. The produce of areas which were sown with this seed and which attained the necessary standards at field inspection is now available commercially and is tagged and sealed as certified Standard N.I.A.B. winter ryecorn.

Intensive selection and progeny testing have also been proceeded with over recent years and improved selections of the N.I.A.B. strain should be available for distribution in due course. By continual selection and multiplication of seed stocks under strict isolation it is hoped to overcome the natural tendency of ryecorns to deteriorate through cross-pollination and so to maintain and possibly improve the high productive capacity of this new and most valuable variety.

Seed Germination

Low-germinating lines of ryecorn seed have probably done as much to diminish the popularity of the crop as have poor strains. Poor germination often results from harvesting the crop when it is not in condition, and ryecorn is more sensitive to damp at harvest than other grains. The slightest dampness is likely to cause heating and mustiness with a consequent decline in germination.

Area of Ryecorn by Counties in Otago Land District in 1948-49

	Green fodder acres	For threshing acres
Waitaki	498	58
Waihemo	40	59
Waikouaiti ..	—	—
Peninsula	—	—
Taieri	71	21
Bruce	75	20
Clutha	533	85
Tuapeka	1,299	266
Maniototo	253	225
Vincent	384	393
Lake	96	250
Total for Otago	3,249	1,377

Poor storage conditions also accelerate the fall in viability of ryecorn seed, and particular care should be taken to avoid storing in damp, poorly ventilated buildings. Even under ideal conditions the germination of ryecorn seed is known to fall off more rapidly than that of other grains. In tests carried out overseas under reasonable storage conditions germinations have been known to drop from 93 to 52 per cent. in 1 year and to deteriorate to 27 per cent. after 2 years.

It is essential, therefore, that growers when purchasing seed should satisfy themselves as to the germination of the seed they are about to buy. All certified lines are covered by a purity and germination certificate, which is held by the merchant and should be made available to the prospective purchaser on request.

The certificate shows clearly the purity, germination, and percentage of pure germinating seeds and lists the impurities in the line. Buyers should make certain that the certificate is of recent date, that the registered number and purity and germination number on the certificate correspond with those on the certification tag attached to the bags of seed, and that the bags are sealed.

Utilisation and Sowing Times

Sown in December ryecorn will provide excellent weaning feed for lambs 6 to 8 weeks after sowing, and a good crop should carry from 20 to 25 lambs per acre for up to 6 weeks, fattening a good proportion of these and leaving the balance in good condition for finishing on rape. December sowings will also provide good flushing feed for ewes before tupping, but cannot be expected to produce the same bulk of spring feed as is provided by later sowings.

Sowings in January, February, and early March will, however, under favourable germinating conditions provide good flushing feed and excellent recovery growth for feeding early in spring. In some areas it is for this early-spring, pre-lambing greenfeed, which is so valuable for the prevention of nutritional disorders in ewes, that ryecorn is principally used. If necessary, sowings may be made as late as April to meet this need.

On fertile soil to gain the best return from crops sown fairly late it is probably advisable to cease grazing early in spring and harvest the crop for grain.

Ryecorn-grass Mixtures

To obtain good, vigorous growth over a longer period various mixtures of ryecorn and grasses have been used, with some success. The inclusion of some short-rotation ryegrass, with or without clovers, with lighter-rate December sowings has resulted in good summer lamb feed and autumn flushing feed, provided mainly by ryecorn, and excellent spring production, due to grass growth compensating for the falling off of vigour in the ryecorn.

In some areas this system has, with good results, been carried one step further and full permanent pasture mixtures have been sown with reduced early sowings of ryecorn. As a result of the high concentration of stock necessary to cope with the early growth of ryecorn and because of the resultant build up of fertility through dung and urine, this system may be of special value when establishing pasture where consolidation is poor and fertility low.

Because of its rapid and prostrate early growth, ryecorn is also invaluable as a stabilising plant on light soils, particularly sands, where wind erosion is likely to occur during early development.

Place in Rotation

Ryecorn besides being a useful crop for sheep and mixed cropping farms and to a less degree dairy farms is valuable as a pioneer crop in the development and regrassing of second-class hill country, where it can be sown on the first furrow, thus providing necessary feed and at the same time, through stocking, bringing about consolidation and assisting in building up fertility. Alternatively ryecorn can be introduced on this country after turnip or swede crops as a final crop before grass and may sometimes be useful, as already mentioned, as a cover crop for temporary or even permanent pastures. On fairly fertile, fully-developed sheep farms ryecorn is probably best included as the final supplementary feed crop before sowing out pasture; on mixed-cropping farms it is very suitable for sowing for greenfeed after a late-harvested cereal crop or for greenfeed and grain after a pea crop and before sowing out pasture.

In areas where conditions do not favour the growing of root crops, especially in Central Otago, lea ground can be ploughed and sown in autumn to ryecorn for spring feed and can then be resown to pasture, thus minimising loss of grazing and at the same time providing out-of-season feed.

Opinions vary as to the value of ryecorn on dairy farms, probably owing to difficulties in grazing management, but it can be very useful as a catch feed crop, particularly when sown after roots for autumn and spring greenfeed.

Seed-bed Preparation and Sowing

Though the highest production of ryecorn will result from sowing on an ideal seed-bed, the usefulness of this crop is to a large extent enhanced by its ability to produce satisfactory crops under comparatively rough conditions arrived at with a minimum of effort and expense on cultivation. As an adjunct to land development this is a valuable feature, and discing and clod crushing of the first furrow are generally considered adequate cultivation before drilling in of the seed or alternatively broadcasting it and discing in.

On more fertile land where smaller areas are involved more care can be taken, but generally ploughing followed by discing, harrowing, and rolling to produce a fairly firm, rubbly seed-bed is the ideal. When ryecorn is sown in autumn the seed-bed is better left rather coarse, but if it is sown with grass or a full pasture mixture, a fine, firm, moist seed-bed suitable for grass and clover establishment is essential.

Ryecorn should be drilled in to a depth of not more than 2in., and if a grass seed mixture is also to be sown, the area should be rolled after sowing and the grass seed broadcast on the rolled surface and covered with light harrows.

Rates of Seeding

When seeding rates are being decided the nature of the seed-bed, method of sowing, climate, germination, and size of seed must be taken into consideration. Ryecorn is smaller than other grains and under good conditions 1¾ bushels per acre of good-germinating seed should be adequate. (A bushel of ryecorn weighs 54lb.) Poor-germinating seed or poor seed-bed conditions must be compensated for by increasing seeding rates.

If ryecorn is sown as a nurse crop with short-rotation ryegrass, the seeding rate should be reduced to 1 bushel per acre or slightly less and 10 to 15lb. per acre of grass seed should be sown. When ryecorn is sown as a cover crop for permanent pasture not more than 1 bushel per acre of good seed should be sown.

Fertilisers

Ryecorn is reasonably tolerant of low fertility conditions, but increased yields can be expected if adequate fertiliser is applied at sowing. Fertiliser requirements vary throughout Otago, but in general at least 1½cwt. of a superphosphate mixture per acre should be applied. Where grain is to be harvested this could, with advantage, be increased to 2cwt.

Ryecorn 4 weeks after sowing, Fruitlands, Central Otago.

On poor land under development liming of at least 1 ton per acre would generally be beneficial, but on more fertile, well-farmed land no extra liming should be required.

Grazing Management

The quick initial growth of ryecorn is not always used to best advantage and the crop is very often allowed to make too much growth before being grazed. If this happens, much of the vigour of the young plants is lost and recovery growth is less productive and poorer.

However, if grazed at the correct stage, when there is about 3 to 4in. of growth, good varieties of ryecorn recover well, and a system of quick, close grazing interspersed with short periods of spelling invariably will result in the highest production.

When the greenfeed is required for sheep grazing in the quick-growth period of summer and early autumn, it is advisable to sow the required area in two blocks at intervals of about 2 weeks. The two areas can then be grazed alternately at intervals of 10 to 14 days. This will allow for each area in turn to be grazed fairly closely, but not bare, and then spelled.

Under the adverse growing conditions of late autumn and early spring longer spelling will be necessary and in any case grazing periods will be influenced more by stock requirements. At no stage, however, should growth be allowed to become too rank, as this will impair palatability and result in a waste of feed. This is particularly important later in spring, when the crop is likely to shoot into ear if not kept closely grazed.

Probably the difficulty of controlling the growth of ryecorn and of grazing it closely during the periods of rapid growth limits the usefulness of the crop on dairy farms, and a combination of sowing in small breaks and feeding with the electric fence will probably give best results with cattle grazing.

Saving Ryecorn for Seed

When ryecorn is saved for a seed crop (the main reason for harvesting the grain in New Zealand) it should not be sown with grass, and grazing, particularly in spring, should be more lenient than it is with a crop grown for greenfeed alone. Management varies according to the soil type and climate. On highly fertile land with an adequate rainfall, where the highest yields are likely, it is of advantage to graze as late as possible to avoid lodging of the crop; on lighter soils or where rainfall is lower earlier closing is necessary to permit sufficient straw growth.

In neither case should stocking be permitted after the first signs of shooting to seed. At this stage plants take on a greying appearance and an examination of the base of the tillers will reveal the minute, immature seed head forming inside the leaf sheaths. Stocking at this time would result in the eating of many of these heads and consequent reduction in yield.

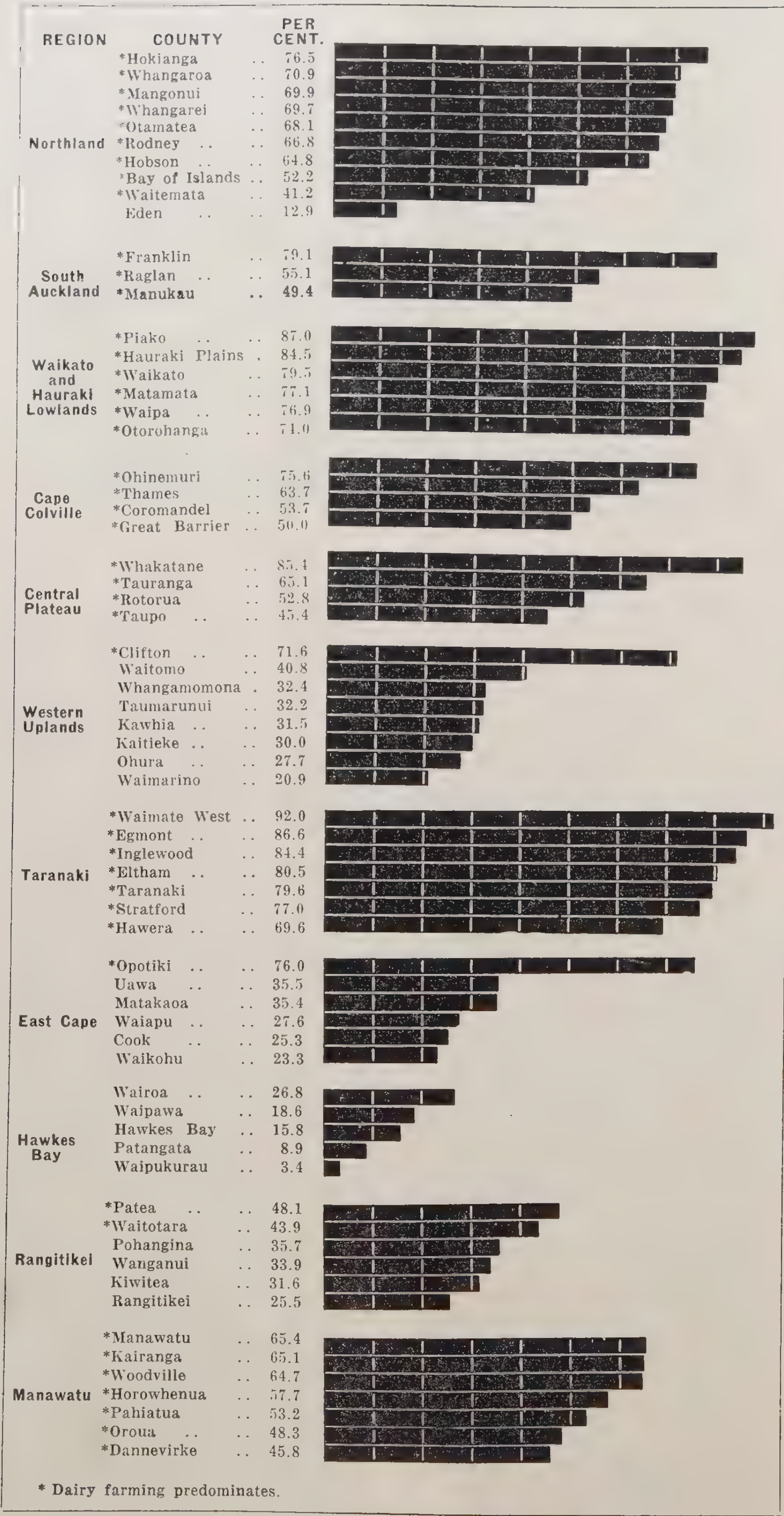
Consequently in most districts areas should be closed from grazing by the latter part of October or earlier if growth is not likely to be heavy.

Ryecorn comes into head fairly quickly, but is slow to ripen and care should be taken not to harvest it too early. Shaking of grain may occur if no rain has fallen during ripening, but when the ripening heads have been subjected to wet conditions the danger of shaking is greatly reduced.

Unevenness of ripening and unfavourable harvesting conditions may necessitate either reaping the crop and harvesting from the stook or windrowing and picking up with the header. Under favourable conditions, however, direct heading is satisfactory provided the crop is allowed to stand until dead ripe. Ryecorn germination is more likely to be impaired by damp conditions and possible mustiness than that of other grains.

Intensity of Dairy Farming

By **W. N. PATON**, Senior Investigational Officer, Department of Agriculture, Wellington



THE dairy farming group of New Zealand farm holdings, which comprises all those where 50 per cent. or more of the total farming effort is devoted to dairy farming of one form or another, is discussed in this article, the third of a series based on detailed classification of data on agricultural and pastoral holdings obtained in the 1949-50 season's special collection for the 1950 World Census of Agriculture. The percentage of dairy holdings to all holdings within a county is used as the index of the degree of popularity of dairy farming. These percentages are shown for all counties in the accompanying graphs.

AN asterisk is shown against the names of counties where more holdings are devoted to dairy farming than to any other main type of farming. There are 50 of these in the North Island and 15 in the South Island. These counties may be termed "dairy counties". Some of them gain the distinction on a surprisingly low percentage of holdings devoted to dairying, as, for example, in Rangiora (29.5 per cent.) and Taieri (29.4 per cent.). A generally wider diversity of farming types is found in most South Island counties, and where three or more main types have substantial followings the percentage for the leading one may be appreciably below 50 per cent., as in the cases quoted.

Most Intensive Dairying Counties

The higher the percentage of holdings in a county concerned in dairy farming the more intensive a dairy county it may be deemed to be. With this basis as a criterion the most intensive dairy counties in New Zealand, ranked in descending order and with their percentages in parentheses, are: Waimate West (92.0), Piako (87.0), Egmont (86.6), Whakatane (85.4), Hauraki Plains (84.5), Inglewood (84.4), Eltham (80.5), Taranaki (79.6), Waikato (79.5), Franklin (79.1), Matamata (77.1), Stratford (77.0), Waipa (76.9), Hokianga (76.5), Opotiki (76.0), Ohinemuri (75.6), Otorohanga (74.0), Clifton (71.6), Whangaroa (70.9), Mangonui (69.9), Whangarei (69.7), Hawera (69.6), Otamatea (68.1), Rodney (66.8), Takaka (65.7), Manawatu (65.4), Kairanga (65.1), Hobson (64.8), Woodville (64.7), Thames (63.7), and Tauranga (61.6).

Not unexpectedly Taranaki is the most prominently placed district, followed closely by South Auckland and with Northland in third place. Only one South Island county, Takaka, gains a place in this list, and only two others, Murchison and Buller, come in the group with 50 per cent. and under 60 per cent. of their holdings respectively devoted to dairying. In some counties there are appreciable numbers of holdings included in the agricultural and pastoral returns which are used mainly for residential purposes, more particularly in counties close to large urban centres. Some counties have a considerable number of holdings included

in Counties in New Zealand

in the returns which are shown as "unused" agriculturally. The percentages of holdings devoted to the main types of farming in such instances are reduced accordingly.

Least Intensive Dairying Counties

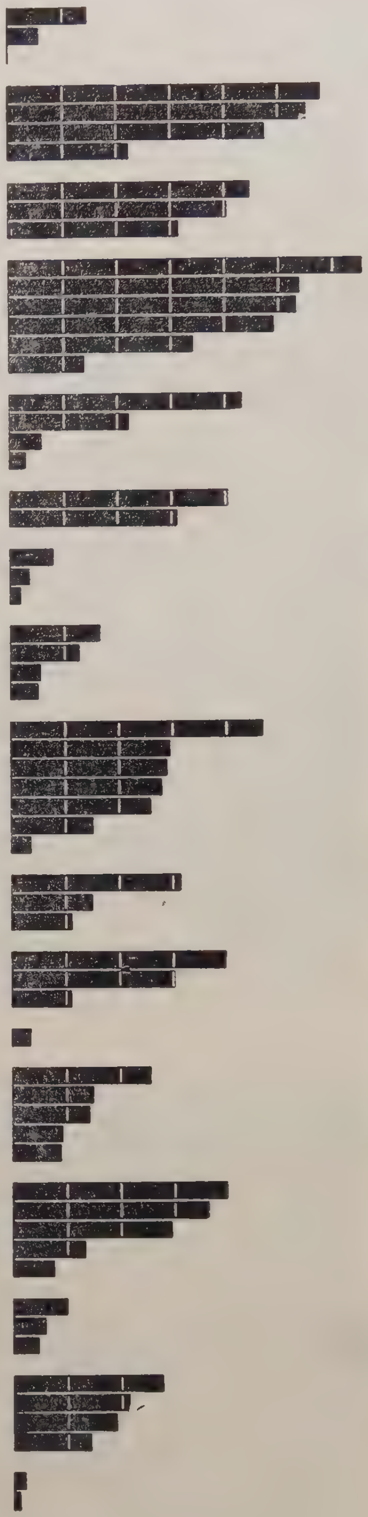
An indication of the reverse position, that is where dairy farming is practised least, is given in the following list of counties in which the percentage of dairy holdings is less than 10: Weber (0.0), Stewart Island (1.0), Amuri (1.9), Chatham Islands (2.1), Sounds (3.0), Mackenzie (3.4), Waipukurau (3.4), Malvern (3.5), Waipara (3.7), Maniatoto (4.5), Ashley (5.2), Selwyn (5.6), Akitio (5.8), Awatere (6.1), Vincent (6.1), Tuapeka (7.6), Cheviot (7.9), Patangata (8.9), Waimate (9.0), Ashburton (9.2), and Lake (9.9). It must not be assumed that because Weber shows 0.0 per cent. there are no dairy cows in the county. Weber had 134 dairy cows in milk on 31 January 1950. The 0.0 per cent. signifies that of the 64 holdings in Weber County not one of them had dairying at as much as 50 per cent. of the total farming effort for the holding.

The following table groups the counties according to the level of their respective percentages:—

Percentage range	North Island	South Island	New Zealand
Over 90	1	—	1
80 and under 90 ..	6	—	6
70 and under 80 ..	12	—	12
60 and under 70 ..	11	1	12
50 and under 60 ..	9	2	11
40 and under 50 ..	11	4	15
30 and under 40 ..	10	7	17
20 and under 30 ..	8	9	17
10 and under 20 ..	4	12	16
Under 10	4	17	21
Totals ..	76	52	128

In the South Island dairying has more competition from other land uses than it has in the North Island. Dairying predominates in several counties close to the two main urban centres, Christchurch and Dunedin. Christchurch has close at hand the dairy counties of Springs, Akaroa, Halswell, and Rangiora, and Dunedin has Peninsula, Waikouaiti, and Taieri. Apart from Kaikoura these are the only counties east of the main divide in the South Island where dairy farming predominates. On the west side of the main divide, however, there is only one county in eight where dairy farming does not predominate. The exception is Waimea, where the main farming area lies within a horseshoe of mountains and hills and is devoted mainly to horticultural pursuits. All the west coast dairy counties lie in the high-rainfall belt of the South Island, where the average rainfall for the year is generally 70in. and over.

In next month's "Journal" details of the sheep farming group will be presented



REGION	COUNTY	PER CENT.
Castlepoint	Castlepoint	14.6
	Akitio	5.8
	Weber	0.0
Wairarapa	*Eketahuna	58.0
	*Wairarapa South ..	55.4
	*Mauriceville ..	47.7
	Masterton	22.5
Featherston	*Featherston ..	44.8
	*Hutt	40.7
	*Makara	31.7
Nelson	*Takaka	65.7
	*Murchison	53.9
	*Buller	53.5
	*Collingwood ..	49.2
	*Inangahua	34.3
	Waimea	14.1
Marlborough	*Kaikoura	43.2
	Marlborough ..	22.3
	Awatere	6.1
	Sounds	3.0
Westland	*Westland	40.7
	*Grey	31.3
North Canterbury	Cheviot	7.9
	Waipara	3.7
	Amuri	1.9
Foothills	Oxford	16.6
	Tawera	12.8
	Selwyn	5.6
	Ashley	5.2
Canterbury Plains	*Springs	46.8
	*Rangiora	29.5
	Ellesmere	29.0
	Eyre	26.9
	Kowai	25.9
	Paparua	15.2
	Malvern	3.5
Christchurch	*Halswell	31.3
	Waimairi	15.0
	Heathcote	11.2
Banks Peninsula	*Akaroa	39.8
	Wairewa	30.2
	Mt. Herbert ..	10.9
Mackenzie	Mackenzie	3.4
South Canterbury	Geraldine	25.7
	Levels	14.9
	Waitaki	14.2
	Ashburton	9.2
	Waimate	9.0
Otago	*Peninsula	39.8
	*Waikouaiti	36.5
	*Taieri	29.4
	Waihemo	13.4
	Tuapeka	7.6
Central Otago	Lake	9.9
	Vincent	6.1
	Maniatoto	4.5
Southern	Southland	27.6
	Wallace	21.3
	Clutha	18.9
	Bruce	14.3
Stewart and Chatham Islands	Chatham Islands ..	2.1
	Stewart Island ..	1.0

* Dairy farming predominates.

The Ringing of Pig Breeding Stock

THE ringing of sows and boars to stop rooting is the subject of a number of inquiries received by the Department of Agriculture. Breeding sows and boars should have access to as much good pasture as possible, and free range over good paddocks is the ideal. However, animals must be prevented from damaging the pasture by rooting, and this is done by ringing the pigs. In this article I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, describes the type of ring to use and the method of inserting it.

MANY different types of ring are in use, the commonest being a piece of wire sharpened, pushed through the snout, and twisted up. This is not satisfactory, however, because it seldom remains in position for more than a few weeks and so needs replacement. As the pig is fully aware of this, the job becomes more and more difficult and unpleasant.

By far the best type of ring to use for breeding stock is the wrought copper ring inserted through the septum or division between the nostrils. These rings remain in position for a long time, frequently for the

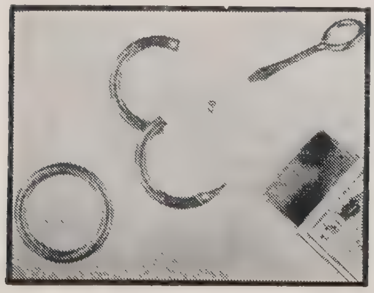


Fig. 1—Wrought-copper pig rings, open and closed, showing locking screw and screw-driver. The match box is to hold the locking screw safely while the ring is being inserted.

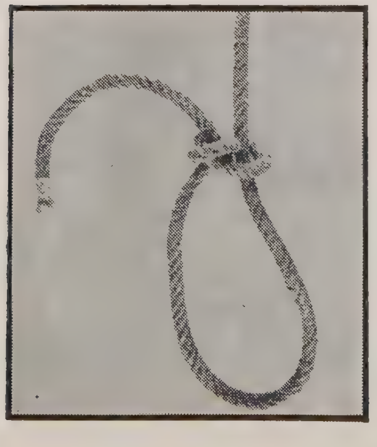


Fig. 2—The running noose with free end for quick release.

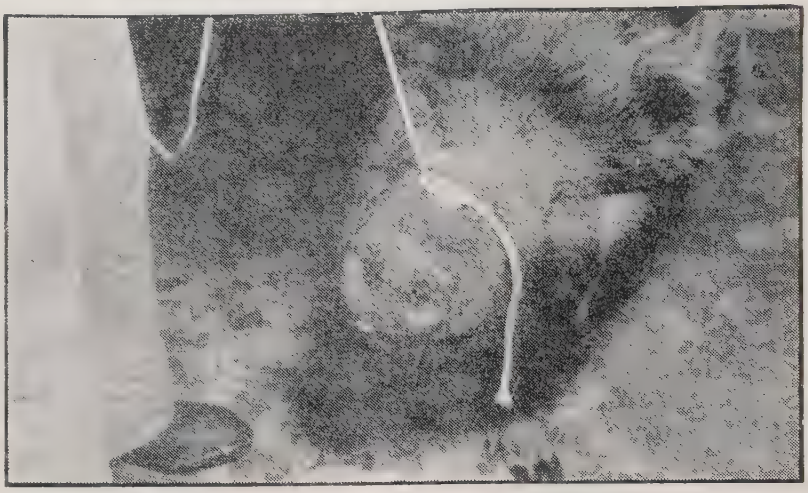


Fig. 3—Sow held in noose ready for ringing.

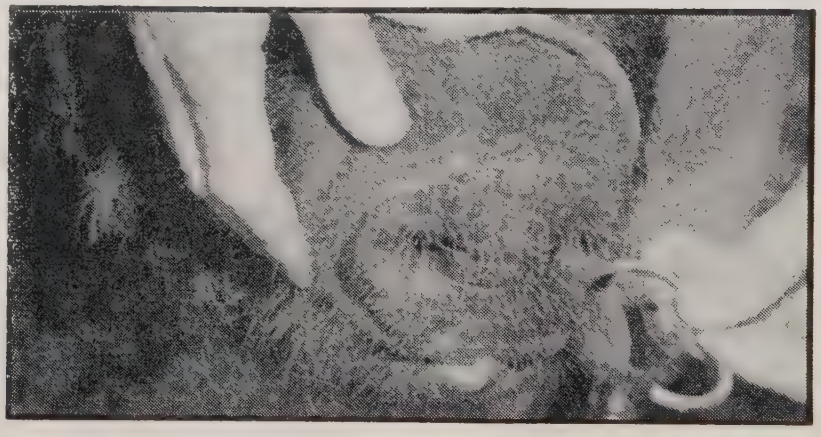


Fig. 4—The ring must be inserted from the animal's left side to keep the hole for the locking screw on top.

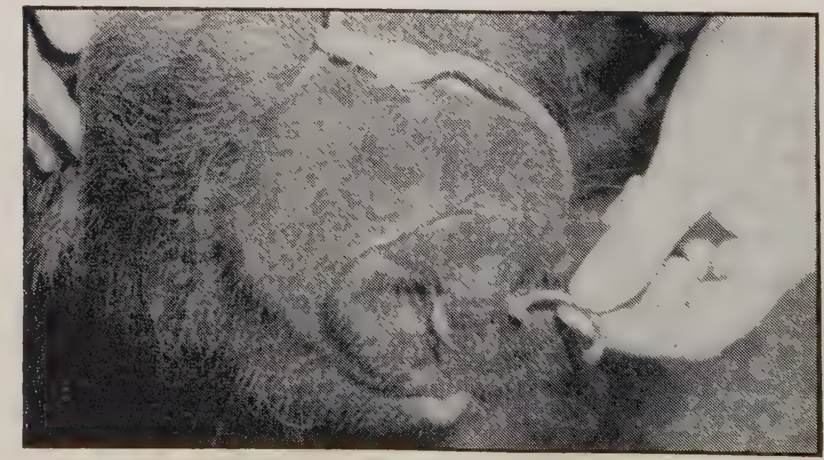


Fig. 5—The ring in position before it is closed.

life of the animal, have no sharp points or ends that can damage other animals, and also look well.

As can be seen in Fig. 1, these rings are hinged in the same way as a bull ring and lock with a similar small screw. The point on one half is sharp enough to make the ring self-piercing. The locking screw is very small and to prevent its being lost during ringing it should be kept in a match box in the pocket until it is required.

Use of Holding Bail or Noose

The animal must be securely held during the operation, and this can easily be done in a holding bail if one is available. If not, a running noose (Fig. 2) round the upper jaw is quite effective. This noose should be free running, and if some 6 to 8in. of free end is left on the rope at the noose, as in the illustration, the noose can be quickly released after the operation is completed. A sow will always pull back on the rope (Fig. 3) and no other control is needed; the rope can be tied to a post or held by an assistant. In dealing with a boar, however, it is advisable to use a rope on one hind leg and tie it securely to a post to prevent the animal coming forward.

With the pig securely held, the ring ready open, and the locking screw and screw-driver (provided with the ring by the makers) carefully put in the match box in the pocket, the sharp point of the ring is pushed through the division between the nostrils. This must be done from the left side of the pig (Fig. 4) to ensure that the countersunk hole into which the head of the locking screw fits is on top. If the ring is put through the other way so that this hole is underneath, it is extremely difficult to get the locking screw in and the risk of dropping it is greatly increased.

The ring will go through the division between the nostrils quite easily, provided it is put in the right place, which is a little way inside the nostril where the division is comparatively thin. The spot can easily be located by the fingers before the operation begins. When the ring has been placed in position (Fig. 5) it is closed up, care being taken to see that the holes for the locking screw coincide, and the screw is put in and tightened (Fig. 6). It is always as well to make sure that this screw is running freely in its thread by screwing it in and out once or twice before attempting the operation. If the ring becomes slightly bent in being pushed through the division between the nostrils, it can easily be straightened before final closing.

When the job is completed (Fig. 7) a pull on the free end of the rope, left for this purpose, quickly releases the pig (Fig. 8).

These rings are designed for use on breeding stock only and are not meant to be used for fattening pigs. They should not be used until the animals are well grown and are at least 6 to 8 months old. They are efficient in preventing rooting and remain on the pig for a long time and cannot cause cuts or scratches on other pigs. They are obtainable in two sizes, 1¼in. and 1½in., the latter being more suitable for really large boars, and are stocked by most hardware merchants in dairying districts.

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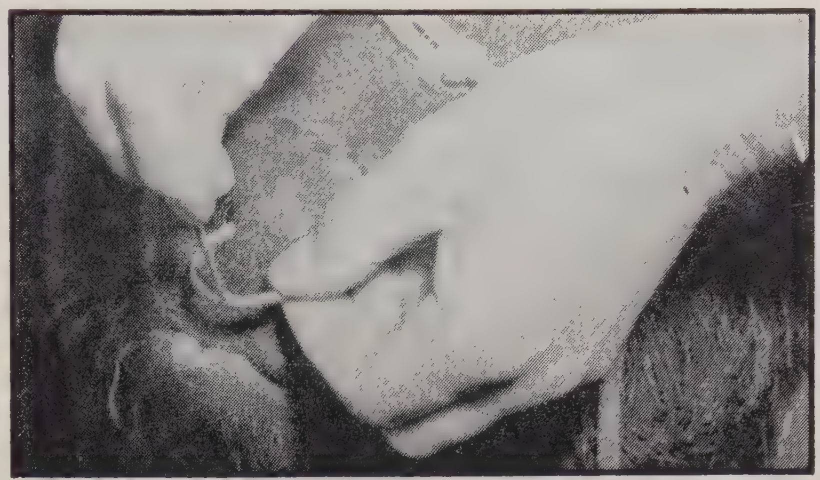

Fig. 6—The ring closed and the locking screw being tightened.

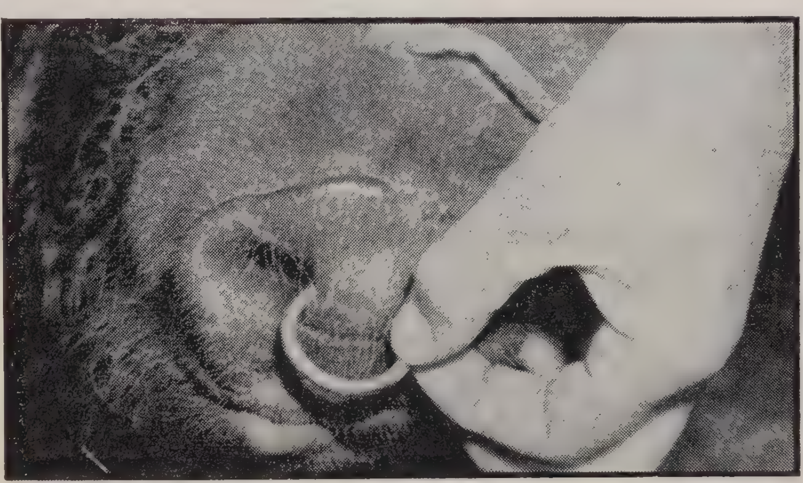

Fig. 7—The ring in finished position.

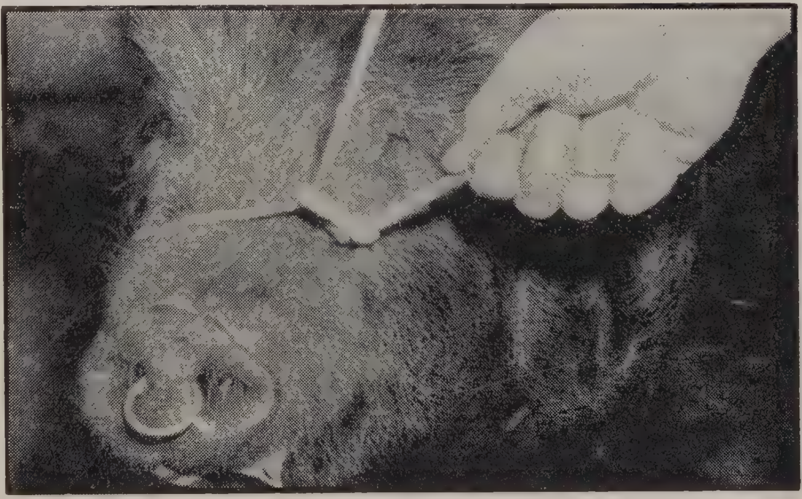

Fig. 8—A pull on the free end of the rope quickly releases the pig.

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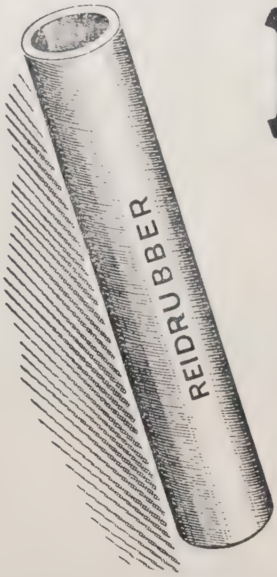
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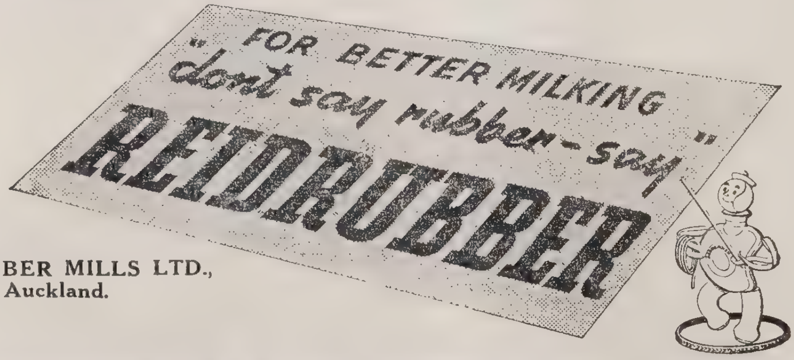
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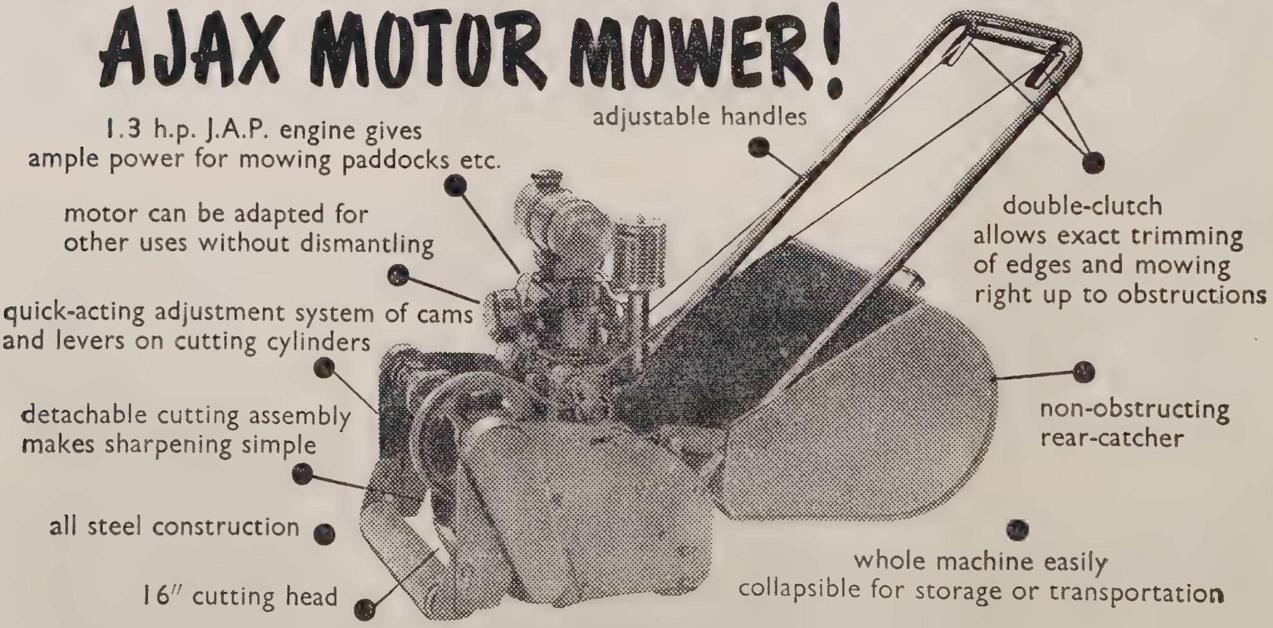
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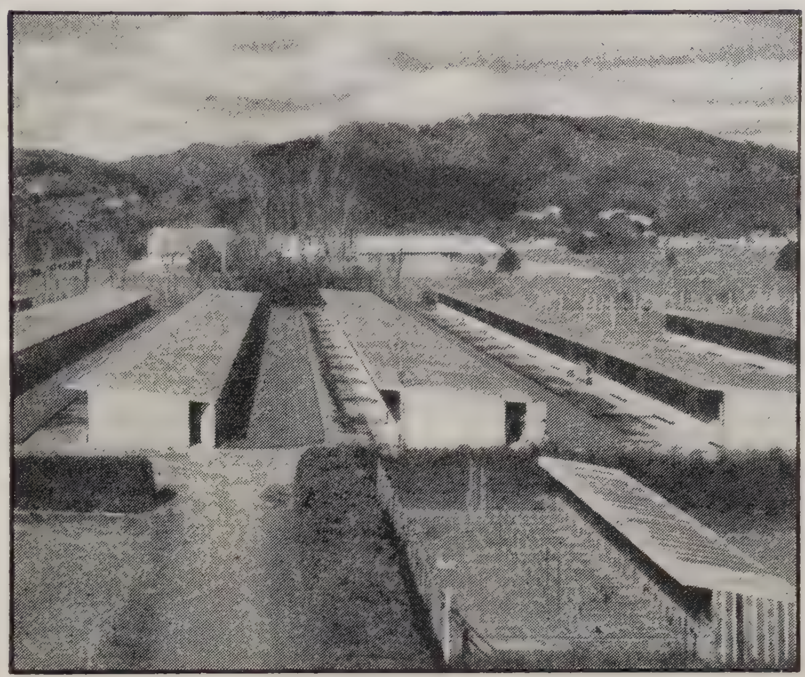
Further Evidence Confirms Need of Vitamin A in Diet for Laying Pullets

TO demonstrate to poultry producers the need for vitamin A in the diet of laying pullets a trial was carried out at the Poultry Demonstration Plant, Upper Hutt, in 1950. A full report on this trial was published in the April 1951 issue of the "Journal" and evoked considerable interest among poultry producers with both large and small flocks. To confirm the results obtained in 1950 a second trial on a smaller scale was conducted in 1951, the results of which follow closely those obtained in 1950. A review of the second trial is given by F. C. Bobby, Superintendent, Poultry Industry, and W. R. Belworthy, Technician, Department of Agriculture, Wellington. In this second trial lawn clippings instead of silver beet were used as a source of green food.



The section of the Poultry Demonstration Plant of the Department of Agriculture where feeding experiments are conducted.

THE trial conducted in 1950 was repeated, at least in part, to confirm, if possible, the positive results obtained in that trial. It was not deemed necessary to repeat that part of the trial which demonstrated the disastrous results which occur if intensively managed laying pullets are kept entirely without a supply of vitamin A by withholding all green food and fish oil from the diet. The majority of poultry producers are now aware of the heavy financial losses likely to be incurred if birds are kept entirely without a source of supply of vitamin A. On the other hand the 1950 trial demonstrated that an average winter crop of silver beet when fed to laying pullets without any other source of vitamin A, such as fish oil, did not result in a level of egg production as satisfactory as where pullets received both silver beet and fish oil or fish oil alone. In other words a poultry producer feeding a winter crop of green food could apparently obtain reasonable egg production and yet this production could be lower than that which could be expected if a vitamin A-rich oil had been used in addition to the green food.

Lawn clippings are a common form of green food used by commercial poultry farmers, but a doubt was felt as to the vitamin A content of these clippings during winter and again during dry periods in summer. For this reason lawn clippings were used as a source of green food instead of silver beet in the second trial.

As was stated in the report on the 1950 trial the effect of vitamin A on the health of birds and their resistance to disease has been fully established. The second trial was designed to give further proof to poultry producers of the value of fish oil as an addition to green food in winter or as a substitute for green food where it is not available.

The number of birds used for this trial was smaller than for 1950, but housing and stock available did not permit of a greater number being used.

Basis of Trial

The trial was started on 9 April 1951 and ended on 10 February 1952, a period of 44 weeks. Australorp-White Leghorn pullets were used, each group containing 25 pullets, which were selected on a random sample basis. All groups were housed intensively in similar pens and apart from diet were managed similarly. The three groups were fed as follows:—

Group 1: Basic ration plus lawn clippings.

Group 2: Basic ration plus lawn clippings plus fish oil.

Group 3: Basic ration plus fish oil.

Basic Ration

All groups were fed with dry mash and grain, receiving in addition oyster shell and hard metal grit. The grain mixture consisted of 75 per cent. of wheat and 25 per cent. of barley, while the mash had the following formula:—

	lb.
Bran	23
Pollard	21
Wheat meal	24
Ground oats	7
Maize meal	10
Meat meal	13
Common salt	1
Ground lime	1
	100

The programme of feeding was a light grain feed (a quarter of the total grain ration) in early morning, green feed to Groups 1 and 2 at midday, and grain feed (three-quarters of the total grain feed) at 4 p.m. Dry mash was available to the birds at all times in hoppers.

Supplementary Foods

Fish oil containing 2000 international units per gramme of vitamin A was fed mixed in the dry mash to Groups 2 and 3 at the rate of ¾ pint of oil per 100lb. of mash. This quantity gives 4500 units of vitamin A per pound of total food—mash and grain—consumed.

For green food, Groups 1 and 2 were supplied with freshly mown lawn clippings throughout the 44 weeks of the trial, no other form of green food being given. The aim was to get the birds in these groups to eat approximately 1oz. of lawn clippings per day. The amounts the birds ate are given later. Every effort was made to collect good-quality clippings daily, particular attention being paid to this point during the winter.

Measurements of Results

The data collected for all groups were:—

Egg production, which affords the main basis for comparison between the three groups.

Food consumption, which coupled with production gives a food-efficiency figure.

Mortality: All birds which died or were removed from the pens were subjected to post-mortem examination, mainly with the object of detecting any lesions of avitaminosis A or nutritional roup.

Yolk colour was noted in eggs from each group, with particular attention to Group 3, which received no green food.

Egg Production

There are two points of interest in the table setting out egg production for each group. First, the average egg production per bird for Group 1, where lawn clippings were the added source of vitamin A, is appreciably lower than the other two groups. Secondly, a careful examination of the figures for winter, June to August inclusive, reveals that the egg production for Group 1 was lower than the other two groups during this period. This is seen clearly in the graph on this page.

Food Consumption

The total consumption of mash and grain per bird for the 44 weeks for the three groups was as follows:—

	Mash (lb.)	Grain (lb.)	Total (lb.)
Group 1 ..	44.6	37.7	82.3
Group 2 ..	45.6	38.0	83.6
Group 3 ..	40.7	38.7	79.4

There is little apparent difference between the figures for each group, but if taken in conjunction with the average egg production per bird, then the food efficiency figures give a clearer picture. The amount of food required to produce 1 dozen eggs is as follows:—

Group 1: 5.8lb.
Group 2: 5.4lb.
Group 3: 5.1lb.

Group 1 consumed approximately 1oz. of lawn clippings per bird daily, but for Group 2 the birds would consume only ½ to 2/3oz. daily.

Mortality

Sixteen birds died or were sent for post-mortem examination during the trial and none showed any lesions of avitaminosis A. Mortality was not considered to be significant as between groups, having regard to the factors being tested in the trial.

Yolk Colour

As in the 1950 trial the yolks of the eggs from birds receiving oil only were significantly paler as compared with yolks of eggs from birds receiving green food.

Egg Returns and Feeding Costs

The results of this trial may be interpreted in terms of money. For this purpose the cost of food used at the Poultry Demonstration Plant has been assessed as follows:—

Mash without oil: 2.79d. per lb. or £23 6s. 8d. per ton.

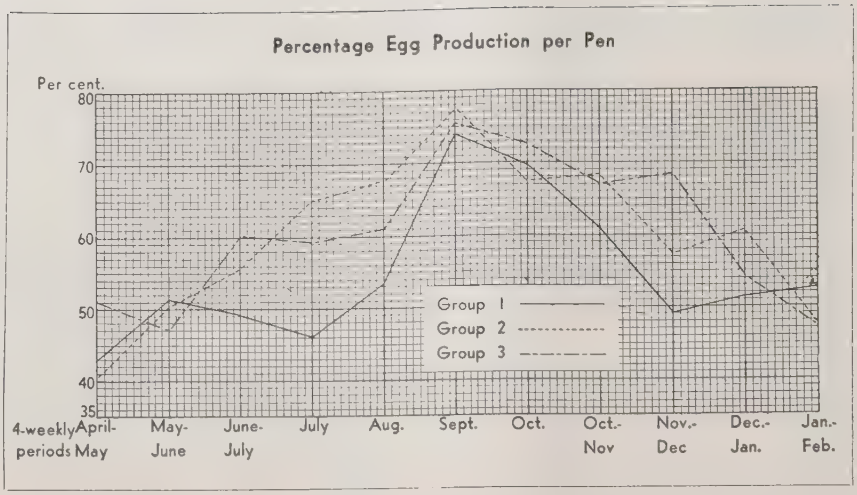
Mash plus oil: 2.98d. per lb. or £24 16s. 9d. per ton.

Grain: 2.76d. per lb. or £23 per ton.

No figure of cost could be computed for the lawn clippings.

Egg returns are based on the wholesale price of standard eggs for Wellington less the egg floor commission and plus the subsidy.

In the following figures food is computed to the nearest pound and eggs to the nearest whole number per bird for each group:—


Percentage Egg Production per Pen

Group 1 (Lawn Clippings)

	£	s.	d.
Return per bird for 168 eggs	2	9	8
44lb. of mash at 2.79d. per lb.		10	2
37lb. of grain at 2.76d. per lb.		8	6
		18	8
Margin of return over feed cost	1	11	0

Group 2 (Lawn Clippings and Oil)

	£	s.	d.
Return per bird for 184 eggs	2	14	4
45lb. of mash at 2.98d. per lb.		11	2
38lb. of grain at 2.76d. per lb.		8	8
		19	10
Margin of return over feed cost	1	14	6

Group 3 (Oil)

	£	s.	d.
Return per bird for 186 eggs	2	15	6
40lb. of mash at 2.98d. per lb.		9	11
38lb. of grain at 2.76d. per lb.		8	8
		18	7
Margin of return over feed cost	1	16	11

The figures illustrate that Groups 2 and 3, where oil was fed in addition to greenfeed or by itself, both have a monetary advantage over Group 1, where no oil was fed, the margins being 3s. 6d. and 5s. 11d. per bird respectively. If these margins per bird are applied to a pen of 100 pullets, the gain by feeding oil appears substantial, being £17 10s. and £29 11s. 8d.

EGG PRODUCTION PER GROUP OF BIRDS IN 1951 TRIAL

	Percentage Production			Eggs per Bird		
Period	Group 1 (greenfeed)	Group 2 (greenfeed and oil)	Group 3 (oil)	Group 1 (greenfeed)	Group 2 (greenfeed and oil)	Group 3 (oil)
April-May ..	43.0	40.7	51.0	12.0	11.5	14.3
May-June ..	51.3	50.5	47.1	14.3	13.9	13.2
June-July ..	49.3	55.8	60.2	13.9	15.6	16.9
July	46.4	65.1	59.2	13.2	18.2	16.8
August	53.5	67.8	61.0	14.9	18.9	18.1
September ..	74.0	77.5	75.5	20.6	21.7	21.6
October	69.7	67.5	72.8	19.5	18.9	20.4
October-November	61.0	68.1	67.1	17.0	19.1	17.9
November-December	49.2	57.4	68.4	13.8	16.0	19.2
December-January	51.6	60.7	54.2	14.4	17.0	15.1
January-February	52.3	47.3	47.2	14.6	13.3	13.2
	—	—	—	168.2	184.1	186.7

Discussion of Trials

The 1950 trial demonstrated the necessity for supplying laying pullets, housed intensively, with a supplementary feed containing vitamin A. It also indicated clearly the advantages of feeding both greenfeed and oil compared with greenfeed only. The 1951 trial has confirmed this latter point with figures that are considered significant. In 1951 the group receiving oil alone showed a financial advantage over the group receiving green food and oil, this being the reverse of what was obtained in 1950. The results in this case are not considered significant, particularly as the average egg production between the groups which received oil and oil and green food varied by only a small margin. In both the 1950 and the 1951 trials the group in each year which received green feed only as a supplementary vitamin A food gave lower egg production during the winter than the other groups. The explanation for the lower production appears to be that the birds which received greenfeed obtained insufficient vitamin A at this time. The green food fed supplied sufficient vitamin A to prevent a collapse in egg production, but insufficient to result in efficient egg production during the winter. This depression in egg production does not begin until the birds have depleted the reserves of vitamin A stored up during the growing period on free range.

Lessons from the trial for commercial producers where laying pullets are housed intensively are as follows:—

It is essential to feed a vitamin A-rich food to prevent a collapse in egg production.

Though good green food will prevent a collapse in egg production, fish oil should be fed as well as the green food during winter.

Where green food is unavailable, available in inadequate quantities, or is of poor quality at any time during the year fish oil fed in the correct quantity will protect the pullets adequately against a shortage of vitamin A and a subsequent lowering of egg production.

Where oil is fed but no green food, pale yolks must be expected. Pale-yolked eggs are sub-standard in quality for marketing.

Maintenance is Main Task in Home Garden in November

By C. L. NAPIER, Horticultural Instructor, Department of Agriculture, Hastings

ALTHOUGH general sowings and plantings will be made for several months yet, most gardens will be well planted up with a variety of vegetables. These will require constant attention during their growing period if good-quality produce is to be expected. Irrigation, weed control, and pest control all contribute to successful production, the last being far more important than many gardeners realise. Even if pests do not destroy crops, the damage they do can make vegetables unusable or at least can detract from their appearance.

VEGETABLE pests are the cause of thousands of pounds worth of crop reduction in New Zealand each year. Heavy loss on commercial areas is usually reflected in higher prices, because of scarcity of products. In the home garden damage to crops through insect attack means fewer fresh vegetables.

Plant-feeding insects in consuming tissue or sap not only cause direct injury to plants, but can transmit virus and other diseases. It is sometimes asked why pests multiply to plague proportions. This is often thought to be due to poor health of plants, but it cannot be said to be always so.

Most of the serious insect pests are outside their natural environment and often no natural parasites are present; the pests therefore have no serious check to their reproduction. Climate is also important, and where the conditions are fairly temperate, as in New Zealand, spread of insects can be rapid. (The term insect applies strictly to animals of the order *Insecta*, but is used here in the general sense to include all pests.)

Types of Insects

For the purpose of discussing control of insects they are classed in this article into three main groups, chewing, sucking (both above ground), and soil-inhabiting. Though there are more or less standard controls for the first two groups, the insects in the third group are much more diverse and therefore require more varied controls.

Chewing Insects

Chewing insects include pests that consume plant tissue such as foliage or bore into tissue such as stems and fruit. Examples of insects in this group and their main hosts (in parentheses) are: Caterpillars of the white butterfly and diamond-backed moth (brassicas), various other caterpillars (beans, tomatoes, potatoes, lettuces, and other crops), vegetable weevil (carrots, beetroot, lettuces, potatoes, tomatoes, and turnips), grass-grub beetle (mainly ornamentals), tuber moth (potato stems and, later, tubers), and slugs and snails (a variety of seedlings).

Sucking Insects

Sucking insects do not consume plant tissue, but live on the sap. There are two methods of feeding. In the first, specialised mouthparts pierce the outer skin of the plant and suck the sap from beneath. Among the pests which feed in this way are aphides and the green vegetable bug. Aphides are of three main colours: Green aphides, which attack a great range of crops including carrots and vine crops, black, which attack mainly beans, and grey, which attack mainly members of the cabbage family. The green vegetable bug favours beans, corn, potatoes, tomatoes, pumpkins, melons, cauliflowers, and clover and several other plants not of importance to home gardeners.

In the second method of feeding the outer surface of the leaf is rasped by sharp teeth and the oozing sap sucked up by the mouth. Thrips, which attack brassicas, onions, beans, cucumbers, squash, melons, turnips, beet, and tomatoes, and red spider, which may attack tomatoes, corn, celery, cucumbers, marrows, onions, peas, beans, strawberries, and other species, are the two main insects of this group.

Soil-inhabiting Insects

Soil-inhabiting insects are a much more diverse group than the previous two and have been grouped only for convenience. Soil-inhabiting insects feed in various ways, chewing above or below ground, boring, or entering and remaining within plant tissue. The group includes cutworms, which chew off young seedlings

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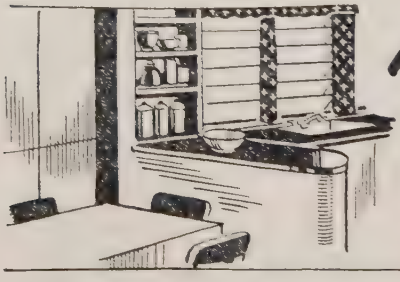

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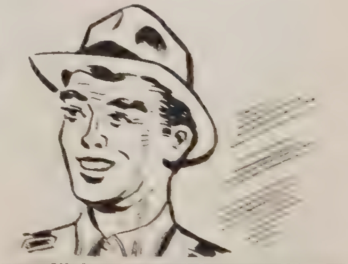

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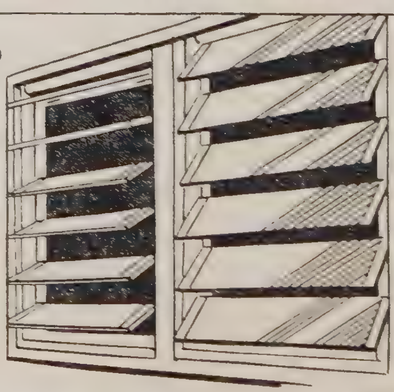

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or eat holes in root crops; woodlice, slugs, and snails, which eat young seedlings; millipedes, which may eat young growth and roots; wireworms, which attack root crops (potatoes in particular); grass-grubs, which may attack roots of strawberries and brassica crops; eelworms, of which there are several species, whose hosts include potatoes, cucumbers, tomatoes, beans, lettuces, onions, rhubarb, parsnips, carrots, and peas, and carrot rust fly, which attacks carrots, parsnips, parsley, and celery.

Control of Pests

In last month's article it was explained that some measure of control of vegetable diseases could be gained through ordinary cultural practices. This does not apply in the same degree to control of insects, but attention should be given to the following:—

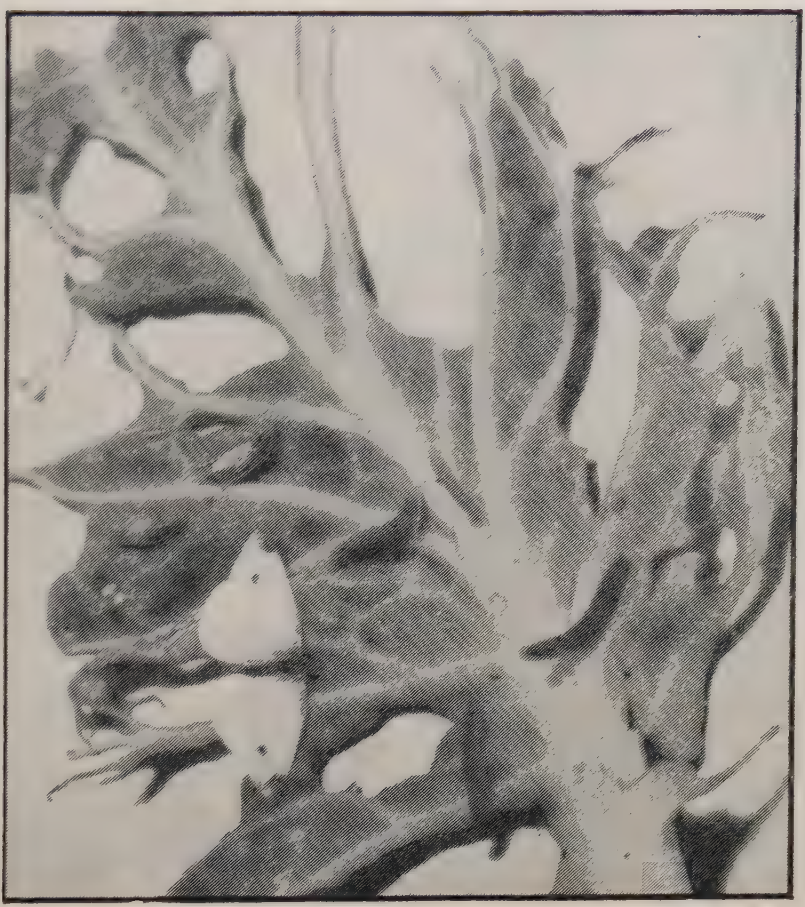
Do not plant too closely: Dense growth provides excellent shelter for insects, which cannot be reached properly by sprays.

Rotate crops when soil pests such as eelworms are troublesome. If tolerant crops can be rotated with cover crops of barley or oats, the number of eelworms will be reduced. It is preferable to grass down for several years, but even if ground is in a cereal for one season the infestation will be reduced considerably. Grasses and cereals are resistant to eelworms and the following vegetables, though attacked, tolerate them: Asparagus, onion, cabbage, cauliflower, celery, sweet corn, parsnip, carrot, radish, rhubarb, spinach, and turnip.

Destroy all crop refuse: This is very important, as insects such as aphides can carry over from one crop to the next if all refuse is not destroyed when a crop is harvested.

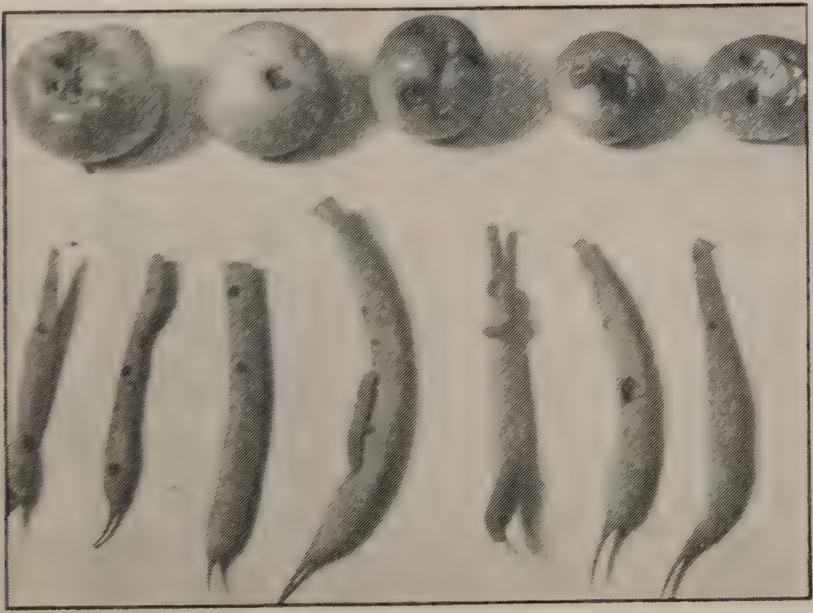
Destroy any badly infested individual plants, as these are always difficult to clean up and usually remain a source of new infestations.

Practise regular cultivation, which will help to kill soil-inhabiting pests such as grass-grubs and cutworms.



[*R. W. Orr photo.*

Cabbage leaf showing serious damage that can be done by caterpillars. On the leaf are a male white butterfly (females have two black dots on each wing), white butterfly caterpillars, a diamond-backed moth caterpillar (the smallest caterpillar) crawling along midrib, and two pupae of the white butterfly (above the butterfly).



[*R. W. Orr photo.*

Severe damage to beans and tomatoes can be caused by boring caterpillars if preventive measures are not taken. These samples were representative of both crops.

Sterilise soil intended for boxes, pots, or seed-beds if it is in doubtful condition to destroy any soil pests. (Methods of sterilising were described in the home garden article in the May issue of the "Journal".)

Hand pick insects from small crops such as tomatoes. Caterpillars can be checked in this manner, but regularity is important.

Practise garden hygiene: A clean garden and surroundings deny cover for slugs, snails, millipedes, slaters, and the green vegetable bug during winter. All rubbish should be removed, particular attention being paid to fencelines, the bases of hedges, and about the compost heap and toolshed. Fencelines adjacent to pastures should have the vegetation removed from their bases to move shelter as far away as possible from vegetable crops.

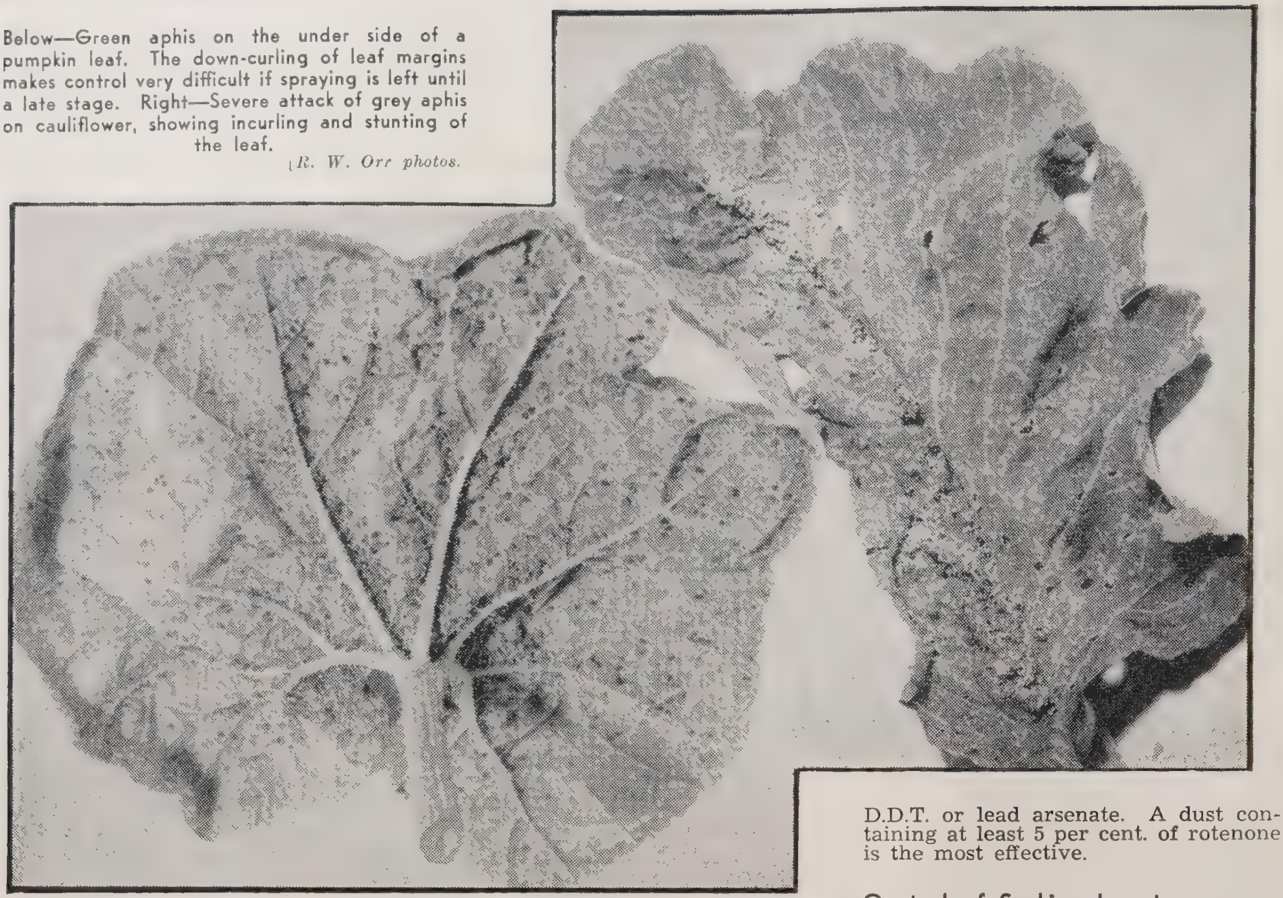
Although the methods described will give some degree of control, it will nearly always be necessary to apply insecticidal sprays to get satisfactory crops.

Insecticides

Sprays for the control of insects are selective in their action, that is, any

Below—Green aphis on the under side of a pumpkin leaf. The down-curling of leaf margins makes control very difficult if spraying is left until a late stage. Right—Severe attack of grey aphis on cauliflower, showing incurling and stunting of the leaf.

[R. W. Orr photos.



particular spray will kill only one or several species. It is therefore necessary to apply several sprays to control various types of insects usually found in the home garden.

Most insecticides are toxic to human beings and all possible precautions should be taken when they are being used.

For detailed information on the toxicity of sprays and precautions necessary readers are recommended to refer to the article "Health Aspects of Plant Therapeutants" by H. Jacks, in the July 1952 issue of the "Journal".

Control of Chewing Insects

As chewing insects consume plant tissue, a stomach poison is the most effective type of spray; the main stomach poisons are lead arsenate and D.D.T. Besides being a stomach poison D.D.T. kills by action on the nervous system after absorption through the skin.

Lead arsenate is effective against caterpillars of the white butterfly and diamond-backed moth on brassicas, brown beetle (grass-grub beetle), potato tuber moth, and the stem borer and fruit borer of tomatoes. For the control of caterpillars on brassicas 1¼oz. of lead arsenate to each 4 gallons of water is usually sufficient, but for potatoes and tomatoes the amount can be increased to 2oz. per 4 gallons. This spray is most effective when applied regularly, and for the tomato caterpillars and potato tuber moth in particular spraying should begin early and good coverage of stems should be maintained to check entry of caterpillars. Spraying of edible portions of plants with lead arsenate should cease at least 3 weeks before harvest to reduce the toxicity hazard from spray residues. For effective control, sprays should be applied at 10- to 14-day intervals.

D.D.T. wettable powder is effective against all the insects controlled by lead arsenate and also against the vegetable weevil, green vegetable bug, and thrips. General control can be gained with ¾oz. of 50 per cent. wettable powder to each 4 gallons of water. If this strength is found ineffective, it can be increased to 1oz. D.D.T. dusts of 1 and 2 per cent. are also effective against caterpillars. As D.D.T. can affect growth of tomatoes, it should not be applied stronger than ¾oz. per 4 gallons to this vegetable. D.D.T. should not be applied to edible portions of plants within 3 weeks of harvest. If pests are troublesome, sprays will have to be applied about every 14 to 21 days.

D.D.D., a material allied to D.D.T., is more effective than D.D.T. on insect pests of beans and tomatoes, and is valuable in that it does not damage tomatoes as does D.D.T. D.D.D. wettable powders can be used at rates similar to those given for D.D.T. and the same precautions should be taken.

Derris dust, which is both a stomach and contact insecticide like D.D.T., may be used against caterpillars. This spray is valuable, as it can be used a little closer to harvest than either D.D.T. or lead arsenate. A dust containing at least 5 per cent. of rotenone is the most effective.

Control of Sucking Insects

As sucking insects do not chew plant tissue, a stomach poison is useless in their control. Therefore a contact poison that kills by absorption or its choking effect must be applied.

Nicotine sulphate is still perhaps the most widely used contact spray. This spray kills by its fumes, which are most effective when temperatures are above 60 degrees F. It becomes more effective when an activator such as 2oz. of soft soap, 4oz. of hydrated lime, or 1oz. of summer oil is used to each 4 gallons of spray. Nicotine sulphate should be used at a rate of at least 4/5 fl. oz. to each 4 gallons of water, but the rate can be increased to 1 fl. oz. with complete safety for plants growing outside.

This spray is most effective against aphides (green fly), and, provided it is used as recommended, it will kill all forms. Nicotine sulphate is also reasonably effective against the adult of the leaf miner, which sometimes causes extensive damage to the leaves of silver beet, spinach beet, and spinach. Thrips can also be controlled with this spray at 1 fl. oz. strength in combination with summer oil 6½ fl. oz. to each 4 gallons of spray.

H.E.T.P., a recently marketed phosphate spray, is a very effective contact insecticide. This material kills by contact only and is very toxic to the user if precautions are not taken. At a strength of 2½ to 5 teaspoons to each 4 gallons of water H.E.T.P. will control all aphides, red spider, and the green vegetable bug. It will also control looper caterpillar of beans. The weaker strength should give satisfactory control of aphides, but the stronger mixture is necessary to control the green vegetable bug. Tomatoes, and to a less extent peas, will not tolerate H.E.T.P. D.D.T. or nicotine sulphate should be used on these crops. As H.E.T.P. breaks down into harmless by-products very rapidly after being mixed with water, crops sprayed with it can be consumed with safety 48 hours later.

Neither nicotine sulphate nor H.E.T.P. is persistent in its residual action on the plant. This makes regular spraying necessary, and applications at 7-day intervals may be required if good control is to be obtained.

D.D.T. is effective for controlling the green vegetable bug, thrips, and the tomato aphis. Unlike some insecticides D.D.T. is rather slow in action and an appreciable effect may not be noted for at least 24 hours. D.D.T. at 2½oz. of 50 per cent. wettable powder to 4 gallons of water will control the green vegetable bug and half that strength will control thrips and the tomato aphis. For thrips on brassicas and onions summer oil at 3 to 6 fl. oz. to each 4 gallons of D.D.T. spray is very effective. If D.D.T. is used on tomatoes for the green vegetable bug at the quantity specified, some plant damage may result, but this is difficult to avoid if adequate control of the bug is to be obtained.

Lime sulphur at 6½ fl. oz. to each 4 gallons of water is another effective spray of the red spider.

Information regarding spreaders and application of sprays was given in the section on disease control in last month's home garden notes. Spreaders are as necessary with insecticides as with fungicides.

Control of Soil-inhabiting Insects

Poison baits can be effective in the control of cutworms, slaters, slugs, vegetable weevil, and earwigs and also give a fair measure of control of snails. A bait can be prepared by dissolving ¼ pint of treacle or 4oz. of brown sugar in 1½ pints of water, mixing 1½lb. of bran and 1 to 2oz. of lead arsenate or paris green together, and mixing the liquid and dry materials. The finished product should be like damp sawdust. The bait should be spread over the infested ground in the evening or placed in small heaps under flower pots or boxes if there is risk of domestic animals reaching the bait.

For slugs and snails a bait made from 1oz. of crushed metaldehyde and 3lb. of bran is very effective. This should be mixed thoroughly and slightly dampened if required and spread in a similar manner to the bait above.

Wireworms are very difficult to control and the treatments often recommended are usually only partially effective. Pieces of carrot or potato attached to a stick and buried under the soil surface usually attract many wireworms. The baits can be lifted periodically and the worms destroyed. Green cropping with mustard or working crude naphthalene at 3oz. per square yard into the soil have also been recommended.

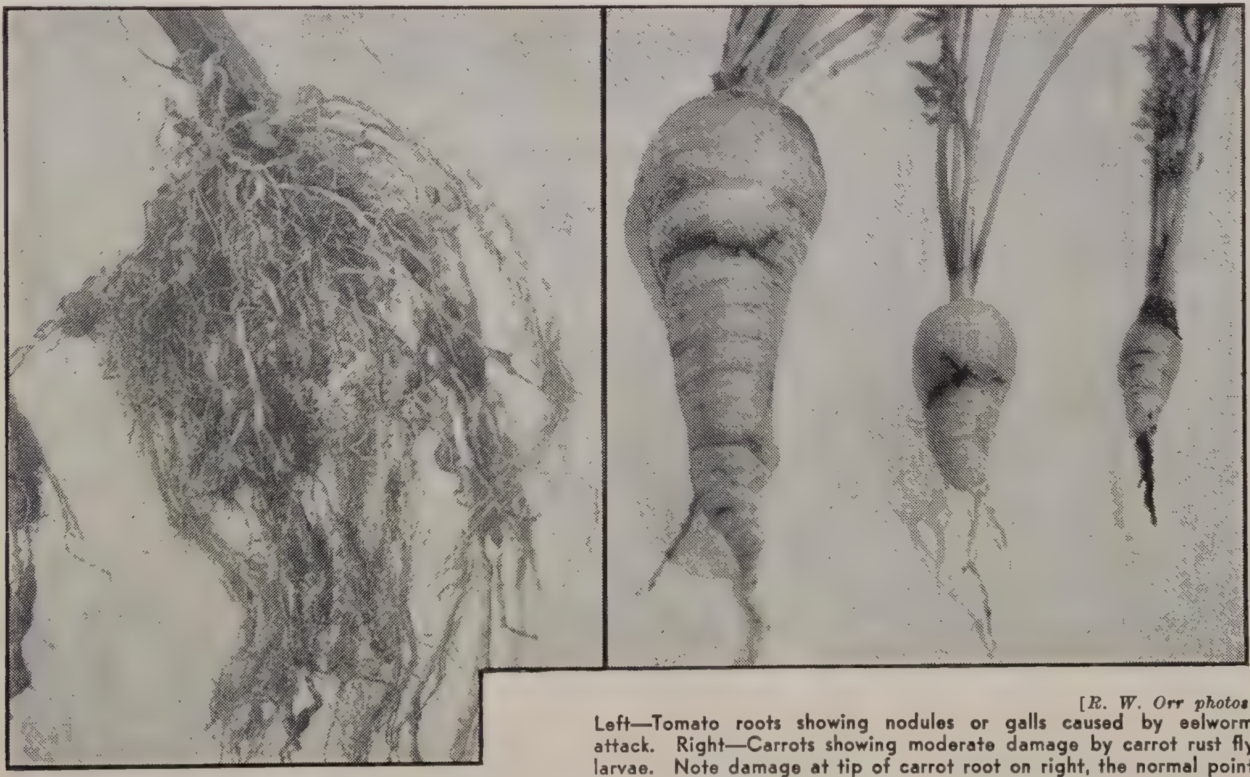
D.D.T. 2 or 5 per cent. dusts applied liberally to the soil give some measure of control. As an alternative D.D.T. 50 per cent. wettable powder can be used at 1¼oz. to each 4 gallons of water.

Millipedes are only occasionally troublesome and can be partly controlled by the potato and carrot bait already mentioned. Nicotine sulphate at 1 fl. oz. to 5 gallons of water plus 2oz. of soap can be used for saturating places frequented by these pests.

Eelworms can be very troublesome and sometimes cause extensive damage. Crop rotation so that tolerant crops are grown on infested soil is one method of control. Bought-in seedlings of susceptible plants should be inspected and any showing suspicious nodules or swellings on the roots destroyed by burning. Soil sterilisation by chemicals offers the most effective method of control and is possible at reasonable cost in the average home garden.

Grass-grubs are normally most troublesome in soil straight from turf. Cultivation is an effective means of control, as many grubs are killed and others are turned up to birds. Fertilisers such as superphosphate stimulate root production and help to counteract grub attack. An application of 50 per cent. D.D.T. at 1½lb. per 1000 sq. yds. should also give some control. For easy application this can be mixed with blood and bone or superphosphate and broadcast over the area.

Carrot rust fly is very serious in some districts and up to the present there is no effective control. Some methods of control are to avoid growing susceptible crops in the same plot for a number of years, harvest carrots as soon as mature, sow in the open away from shelter, destroy heavily attacked roots by burning, and sow between the main egg-laying periods (early spring and autumn). Horticultural naphthalene applied at 2oz. per 9ft. of row first at thinning and then three times at 10-day intervals has a deterrent effect on the fly. The purified form of benzene hexachloride



[*R. W. Orr photos.*

Left—Tomato roots showing nodules or galls caused by eelworm attack. Right—Carrots showing moderate damage by carrot rust fly larvae. Note damage at tip of carrot root on right, the normal point of first entry of the larvae.

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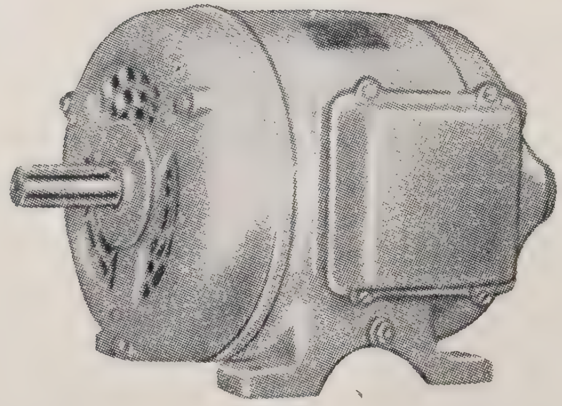

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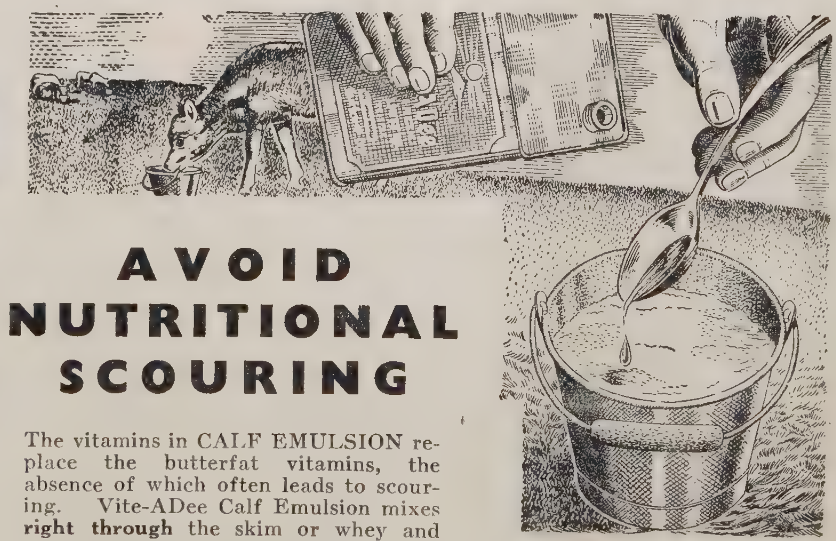

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shows promise as a controller, but until the possibility of its tainting roots is investigated, the material cannot be recommended.

The insect pests, hosts, and controls mentioned in this article are the ones with which the home gardener is most likely to be concerned. However, more detailed information is given in Bulletin 342, "The Home Vegetable Garden" to which reference was made for this article. The bulletin is available at 2s. 6d. post free from main offices of the Department of Agriculture.

MIXING TABLES FOR SPRAYS

Liquids

7 teaspoons = 1 fl. oz.
2 tablespoons = 1¼ fl. oz.
1 breakfast cup = 8 fl. oz.
4/5 fl. oz. of nicotine sulphate = 5 teaspoons

Weights

1oz. D.D.T. wettable powder = 6 level tablespoons
1oz. lead arsenate = 5 level tablespoons
1oz. crude naphthalene = 3 level tablespoons

Measures are approximate only.

Spray Combinations

Home gardeners often wonder whether it is possible to mix two sprays together without damaging the vegetables to which they are applied. There is no doubt that combinations save time and in some cases may even increase the efficacy of the sprays.

The following mix with safety: Summer oil and nicotine sulphate or D.D.T. wettable powder, lime sulphur and lead arsenate or nicotine sulphate, colloidal sulphur and H.E.T.P. or D.D.T. wettable powder, Bordeaux and nicotine sulphate and/or lead arsenate, lime sulphur and D.D.T. wettable powder.

The following should not be mixed: Summer oil with sulphurs (colloidal or lime forms), H.E.T.P. with lime sulphur or lead arsenate.

Spray Equipment

Efficient spray equipment is essential if control of pests and diseases is to be effective. Efficient equipment is not necessarily expensive, and simple but effective appliances can often be constructed. This was shown in the illustration of dusting apparatus in last month's article (page 202).

Bucket pumps are perhaps the most widely used sprayers in home gardens. They are suitable for both vegetables and fruit trees. Double-action types keep up continuous pressure and are preferable though most expensive. For best results one person should pump and another apply the spray. A good length of hose and metal lance will allow the person spraying to reach tall trees and corners where it is difficult to take the pump and container of spray. This type of pump is priced at approximately £2 12s. 6d.

The knapsack sprayer is normally too costly for most home gardeners, but is very efficient. It is usually very economical in spray application. They range in price from about £8 17s. 6d. to £10 5s.

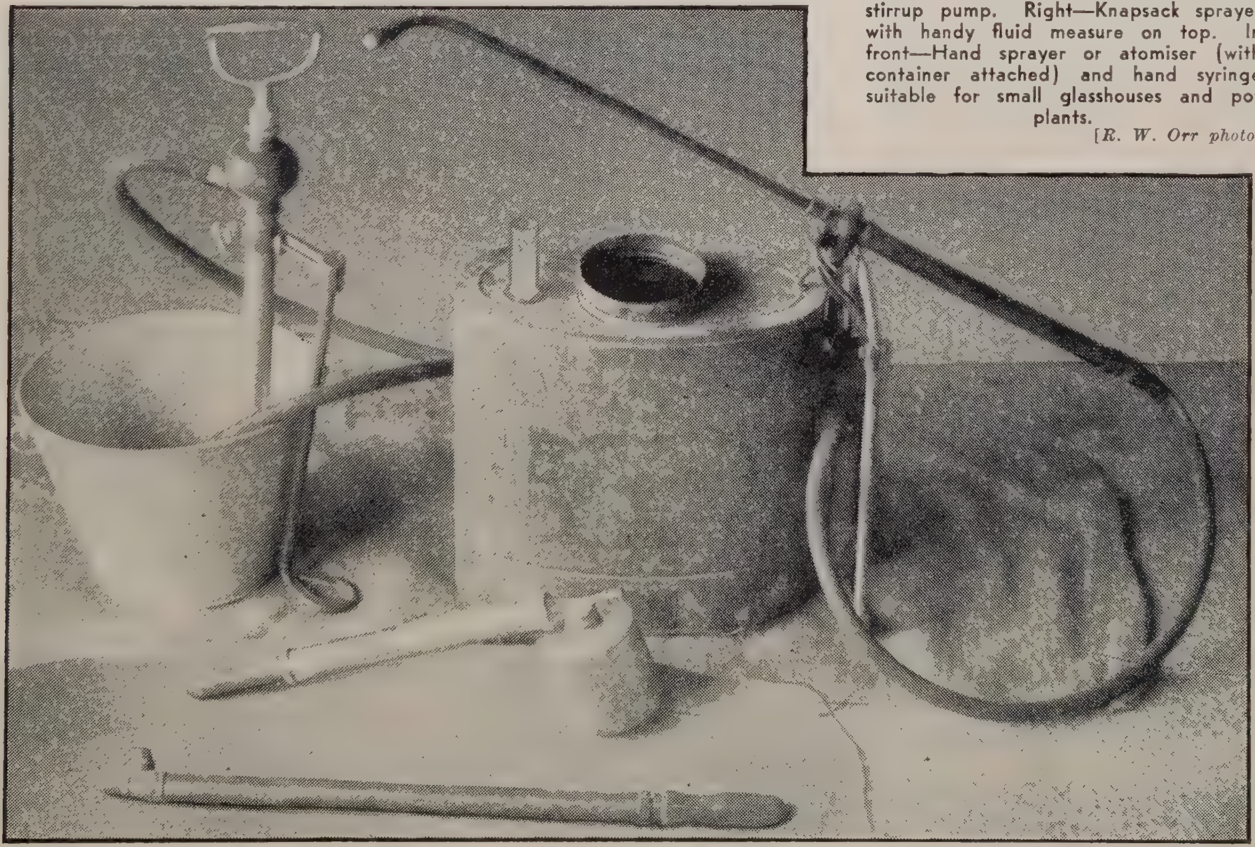
Hand sprayers or atomisers are large editions of fly sprayers. They can be used only for certain spray materials and on certain crops. They cost about £1 12s. 6d.

Dusters: One or two dusters for home garden use are available and usually are very effective. An efficient type is very similar to the atomiser and applies a continuous cloud of dust. This type is priced at about 10s. 6d. A simpler type works on the bellows principle. The bellows are operated by moving the hand up and down in short, rapid strokes and the dust is expelled in puffs. For its size and simplicity of construction this duster is very efficient. It is priced at 8s. 6d.

Spray nozzles are as important as the apparatus itself, if application is to be thorough. Of the two main types used, cyclone and bordeaux, the former is now recommended and is most widely used. It contains a circular whorl chamber, from which the spray issues at pressure through a small hole in a whorl plate in front of the chamber. Holes vary in diameter and it is thus possible to vary the fineness of spray. The well-known Bordeaux nozzle has a stop-cock which can be turned to give a variation in the spray stream. It is not as effective as the cyclone nozzle.

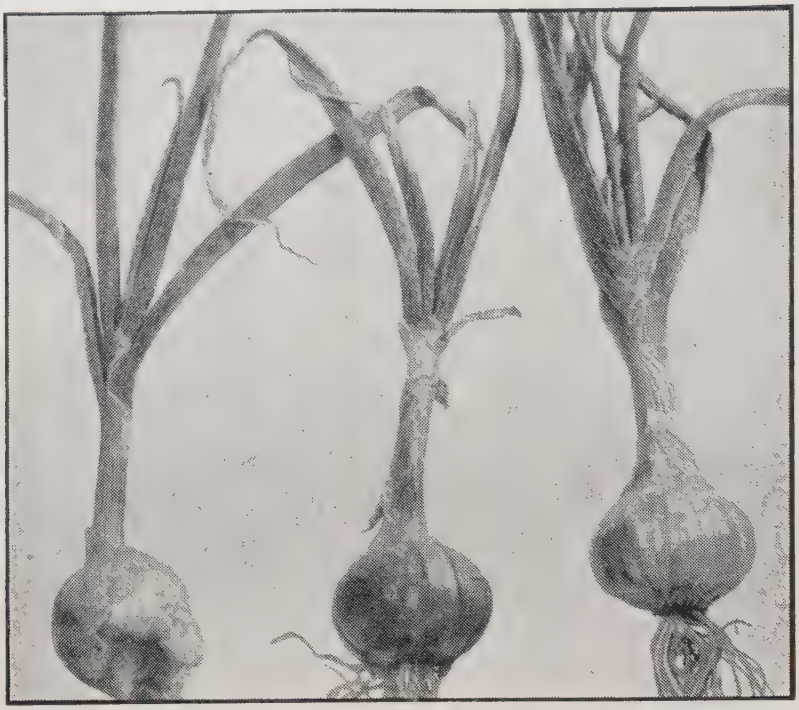
Work for November

In some districts extensive sowings may need to be reduced because of the increasingly dry conditions. Watering of drills and light mulching with fine straw or sawdust after seeds have been sown will assist in keeping the soil cool and moist. Although warmth is necessary for germination, summer soil temperatures, especially when moisture



Spraying equipment. Left—Bucket or stirrup pump. Right—Knapsack sprayer with handy fluid measure on top. In front—Hand sprayer or atomiser (with container attached) and hand syringe suitable for small glasshouses and pot plants.

[*R. W. Orr photo.*



[*R. W. Orr photo.*

The silvery marks on these onion leaves were caused by thrips, which are sucking insects.

is lacking, can reduce considerably the germination of many seeds.

Tomatoes or peas should be staked and climbing beans supported before the roots extend too far into the soil. In the earlier districts tomatoes will need some pruning to allow good air circulation through the plants. Weed control and irrigation should both be practised where necessary, opportunity being taken to locate any perennial weeds among crops for removal as soon as the crops are harvested.

Early potatoes will need moulding up now, care being taken not to injure the roots. As soon as the asparagus season is finished (the cutting season should not be much more than 8 weeks) the bed should be mulched or manured with blood and bone at about 4oz. per square yard to allow the roots to build up reserves for the following season.

Lettuces and cabbages that show signs of hearting and other greens which may be slow in growth should be stimulated by applications of liquid manure either of animal or fertiliser origin. Rhubarb should also benefit from a liberal application of liquid manure. This plant is a strong grower and therefore requires a plentiful supply of moisture and nutrients.

Potatoes of main-crop varieties should be set out without delay.

Plants such as lettuce, radish, spinach, and peas should be sown and planted in succession so that too great a quantity does not come in at one time.

Sowings

Sowings this month can include:—

Dwarf and climbing beans (see the September issue for varieties).

Kale: Green Curled.

Kohl rabi: White and Purple Vienna.

Swedes: Laings Garden (swedes do best in southern districts).

Also the following, varieties of which were listed in last month's notes: Red beet, silver beet, brussels sprouts, broccoli (winter cauliflower and sprouting types), carrot, cucumber, pumpkin, marrow, water melon, pie melon, squash, celery, leek, lettuce, parsley, parsnip, pea, radish, spinach (summer type), turnip, cabbage (winter varieties), and sweet corn.

Plantings

Frost-tender plants can be set out safely in most districts in November. Varieties of vine crops and tomatoes as recommended in last month's notes can be set out now; also cabbages of Golden Acre and Copenhagen Market varieties, globe artichokes (without delay), cauliflower (Phenomenal strains, Early London, and Walcheren), celery (Golden Self-blanching), onions (in late districts), lettuces (Great Lakes strains), silver beet and spinach beet seedlings, and kumaras.

While carrying out general garden operations the gardener should watch for signs of disease and insect attack and take immediate precautions before diseases or pests become firmly established. An occasional spray as a preventive or an immediate application once a pest is noticed will reduce possible losses to a minimum.

The value of healthy, fresh, home-grown produce cannot be overemphasised and gardeners should endeavour to produce adequate supplies for the whole year.

Radio Broadcasts

RADIO broadcasts to farmers will be given as follows:—

1YA Auckland, 7.15 p.m.

5 November—Talk by Poultry Instructor, Department of Agriculture, Auckland.

12 November—“Haymaking and Machinery”, by J. E. Bell, Fields Superintendent, and D. F. Scott, Farm Machinery Instructor, Department of Agriculture, Auckland.

19 November—“Experimental Results on New Types of Phosphate”, by P. B. Lynch, Crop Experimentalist, Department of Agriculture, Wellington.

26 November—Y.F.C. session by Hauraki District Committee of the Federation of Young Farmers' Clubs.

1XH Hamilton, 12.33 p.m.

6 November—“Fly Control on Farms”, by P. J. McCann, Veterinarian, Department of Agriculture, Hamilton.

13 November—“Silage Problems”, by H. M. Bull, Instructor in Agriculture, Department of Agriculture, Hamilton.

20 November—“The Problem of Cattle in the North Island”, by L. K. Wilson, Meat and Wool Section, Federated Farmers, Hamilton.

27 November—“Maintaining Sanitary Conditions in the Household Poultry Run”, by W. L. McIver, Poultry Instructor, Department of Agriculture, Hamilton.

1YZ Rotorua, 7.15 p.m.

13 November—“Quality Defects in Milk and Cream”, by E. P. Carter, Special Inspector, Department of Agriculture, Hamilton.

27 November—Y.F.C. talk by Matamata District Committee of Federation of Young Farmers' Clubs.

2ZA Palmerston North, 12.30 p.m.

3 November—“Seasonal Stock Notes”, by W. W. Hubbard, Livestock Instructor, Department of Agriculture, Palmerston North.

10 November—“Grass-grub Control”, by A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui.

17 November—“Feed Flavours in Milk and Cream”, by G. Purvis, Superintendent of Butter Instruction, Department of Agriculture, Hamilton.

24 November—Y.F.C. session, conducted by I. G. Tabor.

2XA Wanganui, 8 p.m.

6 November—Country women's session.

13 November—“Economics in Fuel Consumption through Efficient Tractor Handling”, by M. Cross, Massey Agricultural College, Palmerston North.

20 November—“Pedigree Breeders of Pigs are Essential”, by the District Pig Council.

27 November—“Experimental Shipment of Chilled Beef and Faster Frozen Beef to Britain”, by H. N. Lore, Department of Scientific and Industrial Research.

2YZ Napier, 7 p.m.

11 November—“By-products of the Meat Industry”, by J. Easton, Meat Inspector, Department of Agriculture, Hastings.

25 November—“Wool Sale Comment”, by R. G. Montgomery, Sheep and Wool Instructor, Department of Agriculture, Hastings.

3YA Christchurch

6 November (7.15 p.m.)—Review of “The New Zealand Journal of Agriculture”, by E. G. Smith, Fields Instructor, Department of Agriculture, Rangiora.

10 November (12.20 p.m.)—Talk by E. Unwin, Field Officer in Rural Sociology, Department of Agriculture, Christchurch.

24 November (12.20 p.m.)—“Wallabies in the Waimate District”, by J. Meyer, chairman, Waimate Y.F.C. District Committee.

Other Broadcasts

1YA Auckland, Tuesdays at 12.35 p.m. and Wednesdays at 7.15 p.m.; 1YD Auckland, Thursdays at 7.30 p.m.; 1XN Whangarei, Mondays and Wednesdays at 8.10 p.m.; 2XA Wanganui, Thursdays at 8 p.m.; 2XG Gisborne, Tuesdays at 8 p.m.; 2YZ Napier, Tuesdays at 7 p.m.; 2ZA Palmerston North, Mondays at 12.30 p.m.; 3YA Christchurch, Mondays at 12.20 p.m. and Thursdays at 7.15 p.m.; 3XC Timaru, Wednesdays at 8.5 p.m.; 4YA Dunedin, Wednesdays at 7.20 p.m.; 4YZ Invercargill, Mondays at 7.15 p.m.

Problem of Brands in Wool Must be Solved

AT the 1951-52 series of wool sales buyers refused to bid on several lines of wool showing evidence of excessive branding. This brought the age-old branding problem home to the owners of that wool in a direct and unpleasant manner, and resulted in much discussion and publicity. It is very likely that most of the brands on these lines of wool were officially approved wool-marking preparations which would scour out and do no permanent damage, but the buyers were within their rights in refusing to bid, because they considered the quantity used excessive. In this article J. E. Duncan, Wool Supervisor, Department of Agriculture, Wellington, describes the steps that have been taken to deal with this difficult problem and gives a summary of suggested further remedies.

FOR centuries there has been this conflict between seller and buyer over wool marking, or branding as it is more commonly called. The grower of the wool wants a mark that will stay on his sheep, resist the weather, and remain legible as long as possible. The buyer is concerned only with washing the wool clean, and anything which will not scour out is likely to damage his final product, be it cloth, felt, or knitting yarn. As buyers have had this trouble with all manner of brands such as pitch, tar, paint, and even worse home-made concoctions for so long, it is little wonder that they are still suspicious of all brands and treat them accordingly.

Direct Opposites Required

Until comparatively recent times the best efforts of chemists and manufacturers were unable to produce a substance suitable for wool marking which would last 12 months and scour out in 12 minutes. These two requirements are practically directly opposed, because most materials which will resist rain and sun and stay on the sheep for a year cannot be washed off in a few minutes with a mild, warm solution of soap and alkali, such as is generally used for wool scouring. After many disappointments, however, materials were produced before 1939 which would fulfil these requirements for New Zealand conditions.

Department of Agriculture's Work

As far back as 1939 the sheep and wool section of the Animal Industry Division of the Department of Agriculture undertook a comprehensive trial of all the wool-marking preparations on the market at that time. These substances were branded on sheep which had been shorn in the normal manner, and for the next 12 months they were given scouring tests and photographed at regular intervals. Several conclusions were reached. First, most of these substances were more or less unscourable and would therefore be considered injurious by the manufacturer of woollen fabrics. Second, a few of them were still completely scourable after a full season's exposure. Third, on account of the rapid growth of wool on the crossbred sheep used, none of the brands remained legible for more than 4 or 5 months.

Applying brands in an official test to determine scourability.

The war held up further work till 1945, but the policy had been formulated that if a few manufacturers could produce scourable products, the others should be obliged to do likewise in the interests of the wool industry generally. Accordingly amendments were made to the Stock Act in 1945 requiring that:—

"(1) No person shall use for the purpose of making any mark on the wool of any sheep any substance or preparation other than an approved wool-marking preparation.

"(2) No person shall sell or offer for sale any substance or preparation intended to be used or purporting to be suitable for use in the making of marks on the wool of sheep unless the substance or preparation—

(a) Is an approved wool-marking preparation; and

(b) Is in a package which bears thereon a statement indicating that the substance or preparation is an approved wool-marking preparation for the purposes of the principal Act.

"(3) No person shall mix with or add to any approved wool-marking preparation any substance other than a clear volatile solvent that has no injurious effect on wool."

The provisions of the amendment have been set out in full to clear up some misunderstandings commonly held.

Manufacturers of wool-marking preparations, which included fluids, raddles, and crayons, had their products tested and were given temporary approval if these were not scourable. They were allowed approximately 15 months in which to formulate new products which would be scourable. The few who were already producing scourable materials received unconditional approval.

New Zealand First to Act

New Zealand was the first country to introduce legislation requiring the testing and approval of wool-marking preparations. South Africa had passed in its Packing and Marking Act of 1930 a clause requiring that wool contaminated by paint or other branding material should be clipped off and packed separately. This put the burden on the wool grower, and did nothing about the drips from the branding iron which inevitably fall into the fleece and are overlooked by everyone, including the wool sorter. The minute drops do not show up again till the cloth is semi-finished, when they appear as costly spots and blemishes. New Zealand's legislation on the other hand strikes at the root of the problem by requiring that the branding material, and even the smallest drop of it, should be scourable and thus incapable of reaching the cloth stage. Eire followed New Zealand's lead in 1947 by passing the Clean Wool Act, which goes even further in stipulating that nobody may buy or sell wool containing a prohibited substance, tar, pitch, unscourable paint, and daggings included. Nobody may manufacture, sell, or buy a dip which imparts a stain or colour to the wool.

Though Australia has passed no legislation along these lines, the Commonwealth Scientific and Industrial Research Organisation (C.S.I.R.O.) has evolved what it has called the Lanoline Base Emulsion (L.B.E.) formula for wool branding, and it has encouraged its wide use in all states. This formula has been made up in New Zealand by certain manufacturers and has had one season's use. Though it did everything claimed for it in regard to scourability, some farmers were unfortunate to have heavy rain soon after branding, and some running of the brands took place. On the other hand, if the brand had time to dry on the fleece before the rain started, it stood up very well and there was no smudging. The makers are now endeavouring to overcome this one disadvantage of an otherwise excellent material.

Testing Wool-marking Preparations

The Department's earlier tests had shown that if a brand would scour out after a month's exposure to the weather, it would also scour out at any subsequent stage up to 12 months or more. As a number of manufacturers had received only temporary approval for their products and were making strenuous efforts to find something better, dozens of new formulas were submitted with urgent requests for a verdict on their scourability. These were all given the month's exposure and scour test, and those which passed were given approval.

When the position finally stabilised with some makers off the market for want of a satisfactory formula, others selling a newly approved product, and the minority who had had approval all along, it was decided to carry out, without warning, check tests of the products being offered for sale through retail channels. These products were given a full season on the sheep from shearing to shearing, and the unpleasant discovery was made that several materials failed during this test, although they had scoured out at earlier stages. The manufacturers were notified of these failures and given a limited period in which to withdraw their products from the market.

This discovery forced abandonment of the 1-month tests, and it was decided that from then on all materials would have to be tested for a year. Unless they will scour out of the wool completely after 1, 2, 3, 6, 9, and 12 months they do not receive Ministerial approval and may not be legally sold or used. It is unfortunate that a full year is now required for testing or check-testing every material, but in the light of present knowledge there appears to be no safe short-cut to speed up the work.

Publicity on Branding

The Department's officers have given wool branding a good deal of publicity through the pages of the "Journal of Agriculture" and other periodicals, through the Press, and over the radio, and they have discussed the subject at farmers' meetings and shown coloured films on it in many districts; the Massey College Wool Association, the New Zealand Wool Board, and Federated Farmers have all talked and written about branding; and the Woolbrokers' and the Woolbuyers' Associations have taken the matter up, but in spite of all this publicity a surprising amount of ignorance on the subject still exists among farmers and even among wool buyers.

Suggested Remedies

In an endeavour to clear up some misconceptions the following summary of suggested steps to improve the position is printed as a small contribution to the great quantity of material already published but apparently not fully understood by some of those most vitally concerned.

1. More districts could take steps to become exempt from wool marking. Under Section 62 of the Stock Act provision is made that ". . . the Governor-General shall exempt any other district from wool-branding on the petition of the majority of the owners of sheep in such district".

2. Many wool producers in their own interests could take more care in applying the wool mark. Less fluid could be applied to the iron, and a neater and more economical job could be made with one of the proprietary branding pads on the market. Above all, an approved fluid should not be spoilt by the addition of such things as linseed oil, lubricating oil, or turpentine to thin it down. This will not only spoil the fluid, mess up good wool, and lose the buyer's good will, but will be an infringement of the law for which there is a penalty of up to £20.

3. Many existing branding irons are too large and could with advantage be replaced by smaller ones. The Stock Act stipulates a wool mark not less than 3in. in length, but if the face of the branding iron measures 3in. in any direction, including diagonally from corner to corner, it will satisfy the requirement. So many branding irons greatly exceed this minimum that in a future revision of the Act it is proposed to fix a maximum size as well as a minimum. The width of bar from which the branding iron is forged could also frequently be reduced with advantage. Many farmers claim that an iron with the letters made from round rod not exceeding ⅜in. in diameter gives the best and clearest results.

4. When branding is being done plastering of the shoulder region should be avoided, as this is the most valuable part of the fleece. If practicable the brand should be put well back toward the rump, where it can be readily skirted off.

5. The Act requires sheep (except in exempt districts) to be branded immediately after shearing, but lambs need not be branded until 30 April. In spite of this many farmers, particularly in certain districts in the South Island, put large brands on small lambs at a very early age. Even though this material should be approved and scourable, the wool buyers will still penalise it on principle, particularly if it is in lambs' wool, which is frequently used for white or pastel-shaded materials.

6. In the experience of Departmental officers the worst offences in the use of non-approved wool-marking preparations have been committed at saleyards and abattoirs. Recent cases brought to the Department's notice have shown the use for ownership marks on sheep of such deleterious materials as traffic-marking yellow, printers' ink, and linseed oil paint. Sometimes these marks are both large and numerous, and it is the Department's intention to prosecute future offenders where there is sufficient evidence. No further warnings will be issued.

7. Farmers and particularly stud breeders should make sure that any tupping pastes they use are approved preparations, particularly in view of the large quantities of these that are smeared into the wool. In their own interests they should rigorously skirt off any coloured wool remaining at shearing and send it in a separate bag or fadge to their broker. If left in their clip this large quantity of colouring material will almost certainly be noticed by the buyers, who are not slow to warn their friends.

8. Another practice that could well be abandoned is the use of bloom dips and powders. If they could be rigorously prohibited, the sheep and wool industry as a whole would benefit.

9. It is unlikely that the wool buyers will change their outlook on branding in the near future, so in the meantime those farmers in exempt districts who use no wool brands could have the broker state this in the catalogue, but the words should be a true statement of fact, that is, "no brands used", if they hope to receive any premium for their wool. To claim to have picked out all brands and then describe the clip as "free from brands" or "brands removed" is misrepresentation, because nobody can remove all the small droplets, and it is these that do the damage if they are non-scourable. The wool buyer will certainly treat them as such if he finds any.

10. Everyone in the wool industry should co-operate in his own interests to use only scourable branding materials, and as little of those as possible, because none of the synthetic fibres suffers from this man-made problem. The wool industry has enough natural hazards without deliberately adding another.

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New Plant Quarantine Regulations

THE Plant Quarantine Regulations 1952, which became effective on Friday, 26 September, consolidate and amend the regulations under the Orchard and Garden Diseases Act 1928 and the Stock Act 1908 governing the importation of fruit, plants, plant products, and soil into New Zealand. The regulations align quarantine procedures with those overseas and take into account modern methods of transport, including aircraft.

Subject to permits being obtained from the Department of Agriculture, controlled importations of certain fruits, plants, plant products, and nursery stock are allowed, provided they carry a health certificate, and in some cases undergo post-entry quarantine for 12 months or one growing season.

The new regulations authorise Plant Quarantine Officers, when necessary, to open, inspect, and treat cargo, stores, baggage, and personal effects of passengers and crew of overseas aircraft arriving in New Zealand. Passengers and aircraft personnel are required to declare whether they have with them any fruit or plants.

The regulations comply with the requirements of the International Plant Protection Convention held in 1951 under the auspices of the Food and Agriculture Organization of United Nations.

◆

First Outbreak of Scrapie Reported in New Zealand

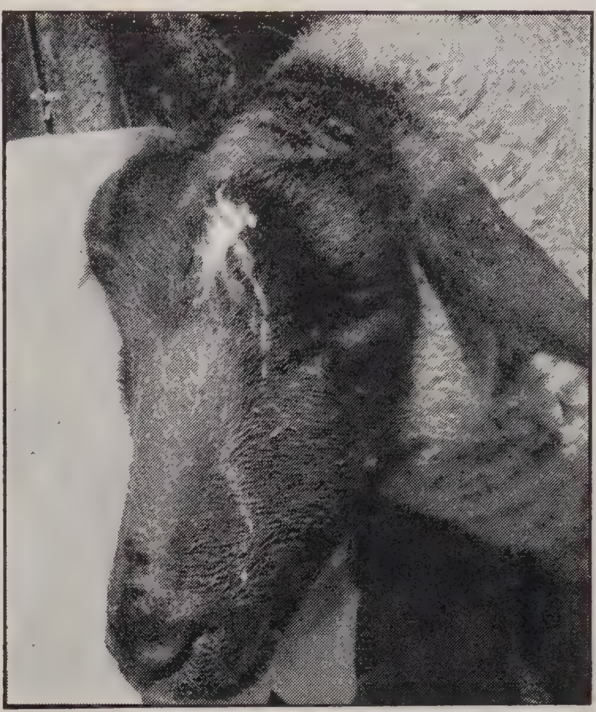
By A. G. BRASH, Veterinarian, Department of Agriculture, Christchurch

THE recent outbreak of the disease scrapie, which affects only sheep, on a farm in the Rakaia district, Canterbury, was the first to be reported in New Zealand. It has also recently been notified in imported sheep for the first time in Australia. In New Zealand the disease has occurred in sheep which were imported from England and which were released from quarantine early in 1950. Because the farmer owning the affected sheep called in qualified veterinary assistance immediately the first symptoms were noticed, the Animal Industry Division of the Department of Agriculture has been able to take early action which should prevent further spread.

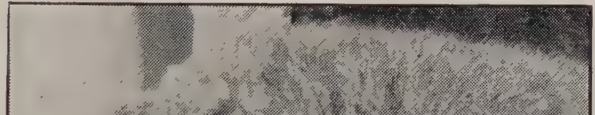
THE total number of sheep of all breeds imported from the United Kingdom since the embargo on direct importation of stock from Britain to New Zealand was lifted in 1947 is 337, and in the same period 82 sheep of the affected breed have been imported. There is, of course, no suggestion that imported sheep other than those in the outbreak under investigation are likely to be affected. One ram and two ewes were affected. The ram and the ewes came from separate properties in England. The diagnosis of scrapie was made mainly on the symptoms shown and the history of the outbreak and was confirmed by further tests carried out at the Animal Research Station, Wallaceville.

Caused by a Virus

The disease is known in Scotland and northern England as scrapie and gets this name from the desire of the sheep to rub itself on fences and other objects because of the itchiness of the skin. It is caused by a virus known to be located in the brain, the spinal cord, and the spleen. The disease has been known in Britain for about 200 years and at one time was fairly prevalent in a large part of England. It is now almost confined to the Border counties and parts of Scotland and the incidence is not high in these areas.



Loss of hair on a sheep's nose because of the itchiness caused by scrapie. The disease has also produced paralysis of the muscles of the left ear.



The hindquarters of a sheep affected with scrapie. Intense itchiness has resulted in wool being rubbed off.

Both ewes and rams are equally susceptible. The incidence in infected flocks is commonly from 4 to 20 per cent. Scrapie is not a highly contagious disease; its spread through a flock is usually slow, but very occasionally may be so extensive that the deaths in a year outnumber the births. Severe outbreaks sometimes occur in which the disease spreads rapidly, especially among the younger sheep of a flock. It is usually spread by the lambs being born with the infection, which they may derive from either the ram or the ewe, even although both parents appear healthy at the time of mating. The infective parent may never show the disease or may do so only after a lapse of several years.

The disease can also be spread through pastures, although experience shows that farms can safely be restocked very soon after the removal of infected animals. The infection may be introduced into a clean flock by the purchase of apparently healthy ewes or rams, and the ram may spread the infection both to his progeny and to the ewe at mating time. Sheep can be infected experimentally by inoculation.

Long Incubation Period

An important feature of the disease is the long incubation period, which is never less than 12 months and usually from 2 to 3 years or even longer. Some sheep may carry the infection without ever showing symptoms. Lambs are never affected and ewes commonly develop the symptoms as 2-tooth about lambing time. There appears to be no maximum to the age incidence, and cases have been seen in 9-year-old sheep of both sexes. In the New Zealand outbreak the symptoms first appeared when the sheep were from 2½ to 3 years of age.

The onset of the disease is insidious and the earliest signs may not be noticed. Probably the first thing noticed, as in the New Zealand outbreak, will be skin irritation and loss of wool, frequently in the region of the hindquarters and loins. Apart from possible injury from rubbing or biting, the skin over the bare area looks quite normal. The loss of wool may gradually extend over the whole body. If the skin is rubbed, the animal shows a "scratch reflex" by making nibbling movements of the lips.

About the same time as the first loss of wool is noticed, or perhaps earlier, other nervous symptoms appear. The sheep is more excitable and restless than usual, especially if rounded up, and trembling of muscles, particularly of thighs and flanks, is apparent. There may be grinding movements of the teeth. The expression is fixed and staring and the head and neck are carried high and stiffly. Movement is often unsteady and in one form a peculiar trotting gait takes the place of the normal sheep gallop.

The nervous symptoms gradually become worse over a period, usually of several months. There is gradual loss of condition and the sheep eventually becomes paralysed. In most cases the disease runs a course of from 2 to 5 months and invariably ends fatally. Curative measures are useless.

Slaughter Necessary

Unfortunately it was necessary in the recent outbreak to slaughter all the sheep in the infected stud and also the sheep that had been sold. The total number involved, including those sold, was about 225. Compensation at full market value was paid for all sheep slaughtered.

It is hoped that this drastic action will prevent further spread, but it is obvious that because of the long incubation period the position will have to be carefully watched for some time. Suspicious symptoms in flocks where imported sheep or their progeny have been used should be reported without delay. Imports of sheep from Britain, which were recently discontinued because of the incidence of foot and mouth disease, may possibly not be renewed until a reliable biological test for scrapie is evolved or until it is considered safe to allow further imports.

Commonwealth Agricultural Bureaux

COMMONWEALTH Agricultural Bureaux are organisations set up by mutual agreement between the British Commonwealth countries to act as effective clearing houses of information for scientists and research workers in agriculture and forestry, mainly by the publication of abstract journals and technical monographs. New Zealand contributes financially to the upkeep of the bureaux, is represented on the executive council which controls their organisation, and sends delegates to the review conferences, which are held every 5 years to advise the executive council on policy. New Zealand delegates who attended the review conference held in 1950 had the opportunity of visiting the bureaux and were very much impressed with the efficiency of their organisation and the competence and enthusiasm of their staffs.

Although most New Zealand agricultural scientists are aware of the existence of at least some of the bureaux, it has been suggested that the fullest use is not being made of all the facilities offered by them. Liaison with the bureaux is maintained by the appointment in each contributing country of a liaison officer, who deals with administrative matters, and official correspondents, who assist their respective bureaux. The liaison officer in New Zealand is Mr. N. A. Marris, Department of Scientific and Industrial Research, Wellington. The bureaux, the respective official correspondents, and some of the principal publications are listed below. Further information on the extensive publishing programme can be supplied by correspondents.

Agricultural Parasitology (Helminthology)

Official correspondent: Mr. L. K. Whitten, Animal Research Station, Wallaceville, Private Bag, Wellington.

Helminthological Abstracts, incorporating Bibliography of Helminthology. First issued 1932; incorporates Bibliography of Helminthology since 1934; 5 parts per annual volume.

Animal Breeding and Genetics

Official correspondent: Dr. F. W. Dry, Massey Agricultural College, Palmerston North.

Animal Breeding Extracts; contains abstracts or reviews of the world literature on the breeding and genetics of domestic and economic animals and birds and their wild prototypes. Often contains review articles. First issued 1933; quarterly.

Animal Health

Official correspondent: Dr. J. F. Filmer, Department of Agriculture, Wellington.

Index Veterinarius; a classified author and subject index of current veterinary literature. Abstracts of the articles of most interest are published in the Veterinary Bulletin. First issued 1933; annual.

Veterinary Bulletin; consists of abstracts of the important literature of veterinary science. First issued 1931; monthly.

Animal Nutrition

Official correspondent: Dr. I. J. Cunningham, Animal Research Station, Wallaceville, Private Bag, Wellington.

Nutrition Abstracts and Reviews; contains abstracts of the current literature on human and animal nutrition. Each issue contains a review article. First issued 1931; quarterly.

Dairy Science

Official correspondent: Dr. H. R. Whitehead, Dairy Research Institute, Palmerston North.

Dairy Science Abstracts; consists of abstracts of current literature on all aspects of milk and milk products for both research and extension workers. First issued 1939; monthly.

Horticulture and Plantation Crops

Official correspondent: Mr. A. M. W. Greig, Department of Agriculture, Wellington.

Horticultural Abstracts; consists of abstracts of the current literature on horticultural and plantation crops. It deals also with certain crops hard to classify, such as potatoes, tobacco, and a number of minor crops. For the purposes of the journal, horticultural crops include all those whose products normally appear as fruits, vegetables, nuts, and flowers. All tropical and sub-tropical perennials such as tea, sugar cane, etc., are considered to be plantation crops. First issued 1931; quarterly.

Pastures and Field Crops

Official correspondent: Dr. J. Melville, Grasslands Division, Department of Scientific and Industrial Research, Palmerston North.

Field Crop Abstracts; consists of abstracts of the current literature on the cultivation and agricultural botany of crops grown in field rotations. First issued 1948; quarterly.

Herbage Abstracts; consists of abstracts of the current literature on grassland husbandry and fodder production. First issued 1931; quarterly.

Plant Breeding and Genetics

Official correspondent: Dr. E. J. Godley, Crop Research Division, Department of Scientific and Industrial Research, Lincoln.

Plant Breeding Abstracts; consists of abstracts of all the literature of interest to plant breeders. First issued 1930; quarterly.

Soil Science

Official correspondent: Mr. N. H. Taylor, Soil Bureau, Department of Scientific and Industrial Research, Wellington.

Soils and Fertilisers; consists of abstracts of the current literature on soils and their uses. Each issue contains a review article. First issued 1938; bi-monthly.

Bibliography of Soil Science, Fertilisers, and General Agronomy. Consists of references arranged in universal decimal classification order. Later issues serve as cumulative indexes to Soils and Fertilisers. First issued 1935 for years 1931-4; triennial.

Forestry

Official correspondent: Mr. F. Allsop, Forest Research Institute, Whakarewarewa, Rotorua.

Forestry Abstracts; contains abstracts of the current literature on all aspects of forestry and forest products. A review article is usually included. First issued 1939; quarterly.

Forest Products and Utilization. (Reprint of Section 3 of Forestry Abstracts.) First issued 1946; quarterly.

Biological Control

Official correspondent: Dr. D. Miller, Entomological Research Station, c/o Cawthron Institute, Nelson.

Catalogue of the parasites and predators of insect pests; irregular. First issued 1943.

Entomology

Official correspondent: Dr. D. Miller, Entomological Research Station, c/o Cawthron Institute, Nelson.

Review of Applied Entomology; consists of abstracts or reviews of the current literature on economic entomology throughout the world. Published in two series. Series A deals with insect and other arthropod pests of cultivated plants, forest trees, and stored products of animal and vegetable origin. First issued 1913; monthly. Series B deals with insects, ticks, etc., conveying disease or otherwise injurious to man and animals. First issued 1913; monthly.

Bulletin of Entomological Research; consists of original articles on economic entomology. First issued 1910; quarterly.

Mycology

Official correspondent: Dr. F. J. Newhook, Plant Diseases Division, Department of Scientific and Industrial Research, Private Bag, Auckland.

Review of Applied Mycology; consists of abstracts or reviews of all current literature on applied mycology and plant pathology. First issued 1922; monthly.

Index of fungi (formerly Supplements to the Review of Applied Mycology); lists new species and varieties of fungi, new combinations, and new names. First isued 1940; semi-annual.

Bureaux Services

The bureaux will answer inquiries put direct by scientists and research workers and put inquirers in touch with the best sources of whatever information they may be seeking. They also assist research workers by giving information about research centres, by arranging meetings between workers, by arranging exchange of experimental material, and by giving information on matters such as post-graduate study and sources of supply of apparatus and equipment. The bureaux can, on occasions, supply photographic reproductions or microfilms of papers not available in New Zealand libraries; they are prepared to assist in the preparation of bibliographies, and, in special cases, will even furnish a memorandum of digested information. Two of the institutes maintain identification services. Fuller information may be obtained from an excellent conspectus, which may be consulted in most libraries.

The Commonwealth Agricultural Bureaux offer to workers in the field of agricultural science a magnificent service, which should be used to the fullest extent. The publications of the Bureaux should be widely available, and workers should not hesitate to approach the Bureaux for the valuable assistance which they are so willing to provide.

Controlling the Swarming of Bees

Seasonal Notes for the Domestic Beekeeper

PREVENTION of swarming will engage the attention of domestic beekeepers during October and November, depending on the district and climate. Measures to control swarming are discussed in this article by T. P. J. Williams, Apiary Instructor, Department of Agriculture, Hamilton.

Even from a well-managed apiary bees will sometimes swarm.

SWARMING, which remains one of the beekeeper's biggest problems, is the natural method by which bees propagate. This instinct has been curtailed to a certain extent by the introduction of modern hives and modern methods. However, even in the best-regulated apiaries swarming will occur despite the beekeeper's rigid precautions. If the hive is to be kept for the production of honey, it is essential that the bees do not swarm. A colony is so weakened after a swarm has issued that it seldom recovers in time to be able to gather a surplus crop of honey during the current season.

Factors Influencing Swarming

The first indication the beekeeper receives that the bees are preparing to swarm is the presence of large numbers of drones within and flying from the hive.

Seasonal conditions influence swarming; a mild spring encourages the colony to build up in strength too rapidly, with the result that it becomes crowded long before the honey flow begins, and swarming fever is developed. An old queen within the hive will greatly increase the bees' desire to emigrate, and some strains of bees have a far stronger tendency to swarm than others. Many other factors influence the tendency to swarm, such as overcrowding or congestion of bees within the brood nest, insufficient ventilation, and an excess of drones. Provided a normal season is experienced, the beekeeper may, by careful management, avoid most of the conditions mentioned.

Value of a Young Queen

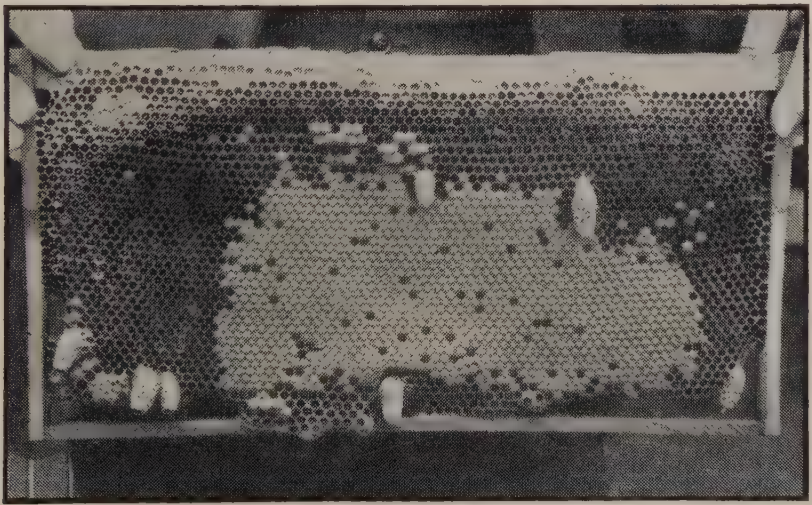
The importance of a young queen at the head of the colony cannot be stressed too greatly and is a major factor in swarm control. The bees will not tolerate an aged or failing queen for very long and soon rear young queens either to supersede the old queen or to swarm. It has become generally accepted among beekeepers that a queen is past her prime when she is over 2 years old, after which her egg-laying capacity becomes exhausted. The beekeeper should requeen the hive after every second year, the autumn being the best time of the year to introduce a new queen. Some strains of bees appear to have a stronger tendency to swarm than other strains, especially the black bee, and it is therefore important that the beekeeper should requeen the colony with a queen procured from good stock. The Italian strain of bee appears most suitable for New Zealand.

Overcrowding

Congestion of unemployed bees within the brood nest will soon create the swarming fever, but if the combs are correctly spaced, with 9 frames in each super, there will be more space for idle bees. Colonies having large brood chambers are less inclined to swarm than those having brood chambers too small. When a colony is confined in only one super, overcrowding will probably occur, for if the queen is to give of her best, she must be allowed two supers in which to breed. If the hive is found to have about 6 frames of brood and is in only one super, another super of drawn combs should be added.

Ventilation

It is extremely difficult for the bees to ventilate the hive properly if the entrance is too small. If the bees show a tendency to cluster at the entrance, indicating that the hive is poorly ventilated, extra ventilation should be provided. Insufficient ventilation is a factor in excessive swarming, and to counteract it a large force of bees is employed in carrying out work which can be largely obviated if the beekeeper will study the requirements of his bees. Strong colonies should be given full-sized entrances in summer and where necessary the front of the hive may be wedged up an inch or so from the bottom board. These manipulations may not be necessary until late November or December, according to the district and weather.



Comb, showing drone brood, worker brood, and natural swarm cells.

Influence of Drones

The presence of excessive drone brood and drones is undesirable and can be avoided by using only good worker combs in the brood nest. It is a frequent mistake among beginners when assembling frames to insert only half sheets of foundation wax in full-depth frames; consequently one half of the comb is drawn out with drone cells. When such combs are included in the brood nest large numbers of drones are reared. It is therefore of great importance to have only good worker combs for the queen to breed in. Any drone brood within the hive should be destroyed by cutting the tops off the cells with a sharp knife; this can be done fairly simply, as capped drone brood protrudes beyond worker brood.

Destroying Queen Cells

Swarming may be prevented by destroying queen cells built by the bees. Swarm cells are numerous and are usually constructed along the lower edges of frames or from any irregular surface of the comb. Once swarm cells have been started by the bees the hive will have to be examined every 8 to 10 days and all queen cells destroyed. Great care will have to be taken when searching for them, as they are easily overlooked. A good method is to shake each comb free of bees before it is examined; there will then be little chance of missing a swarm cell.

◆

Grassland Association Conference

A HIGH degree of efficiency has been reached in grassland farming in New Zealand, but many problems in maintaining and developing pastures are still to be resolved, and these are a focal point at the annual conference of the New Zealand Grassland Association, to be held this year at Timaru from November 25 to 28. Apart from lectures there will be visits to farms and a showing of the film "The Grasslands of New Zealand".

Research work into blind seed disease of ryegrass will be briefly summarised by P. B. Lynch, Crop Experimentalist, Department of Agriculture; J. M. Kelsey, Officer in Charge, Department of Scientific and Industrial Research Entomological Research Station, Ashburton, will deal with control of *Odontria* (grass-grub).

Papers on tussock grasslands will be given by I. E. Coop (Professor of Animal Husbandry, Canterbury Agricultural College), R. D. Dick (North Canterbury Catchment Board), T. G. Sewell (Instructor in Agriculture, Department of Agriculture, Christchurch), and R. K. Ireland (farmer, Oamaru).

Various aspects of molybdenum application to pastures and crops, a comparatively new practice, will be dealt with in papers by E. B. Davies (Senior Chemist, Department of Agriculture Soil Research Station, Rukuhia), W. R. Lobb (Instructor in Agriculture, Department of Agriculture, Oamaru), G. A. Holmes (Superintendent, Invermay Research Station), and A. F. R. Adams (Chemist, Canterbury Agricultural College).

Several other papers on pastures and allied subjects will also be given.

◆

BOOK REVIEW

"Improving the World's Grasslands": An FAO Study Prepared by A. T. Semple

THE author A. T. Semple, with the assistance of a number of contributors, has condensed into this book, "Improving the World's Grasslands", an FAO study which is of fewer than 150 pages, a very large number of facts and statistics on the world's grasslands. Throughout the volume argument is usually supported by facts and figures derived from experiments.

In the early pages grassland is placed in the correct perspective in relation to cropping. Occupying a fifth of the land surface of the world, grassland produces less than a tenth of the world's food supply. On the other hand, cropping land, which occupies a tenth of the world's surface, produces 90 per cent. of the world's food from the soil. In some countries fish supplies a substantial portion of the food supply.

In a discussion on grassland in its widest sense the statement is made that grassland is on country which is not fit for producing cultivated crops.

The amount of high-producing fattening grassland is very small compared with the vast areas of unimproved or depleted native grassland, much of which is covered to a greater or less exent with woody shrubs. It is not surprising, therefore, that this book emphasises the problems associated with poor grassland. Undoubtedly related to this is the statement that the most common deficiency in livestock is the lack of sufficient total feed.

In New Zealand the fencing of grassland into properties and paddocks is accepted as a basic principle of grassland farming and is related to production by owner or tenant (lessee) farmers whose responsibility it is to carry out maintenance and improvements. In many of the poorer grasslands of the world, farming is based on communal use or open range grazing. It is pointed out that under these conditions it is almost impossible to improve the grassland because no individual is anxious to do this work when there is no assurance that he will receive any of the benefits.

Any plans for improvement of this type of grassland must be based on management, which is the cheapest and most readily acceptable method. An example of the effect of management is given in relation to run-off in soils where water is a limiting factor to plant growth. It is stated that under close grazing 45 to 70 per cent. of the rainfall may be lost, whereas only 10 per cent. is lost under light grazing. This type of management also encourages the survival and production of the valuable plants.

An interesting chapter is devoted to plant selection, in which the comment is made that "Farmers' needs for improved strains of legumes and grasses cannot be filled, or the world's soil resources protected, unless essential seeds are available at reasonable prices, in large and dependable quantities, and at convenient locations". In order that correctly named seed can reach the consumer the principle of seed certification is advocated and New Zealand practice is quoted.

In the reseeding of native grassland the point is made that it is necessary for the grass seed to be buried in the soil. This can be done either by sowing in deep ash following burning or in ground that has been disturbed with a "disk drill", the machine itself and the work that it does being shown in accompanying illustrations.

In discussing the control of noxious weeds, shrubs, and poisonous plants the author states that "Little or nothing is gained by eradicating one weedy plant if it is to be replaced by another. Any attempt at eradication should be accompanied by such management as will promote the desirable vegetation in its competition with the undesirable."

The section on burning of grassland is worthy of study, particularly to persons in New Zealand interested in tussock grassland. Conclusions on this controversial subject have been based largely on inadequate data. The following statement by the author is of interest: "Those who do not make a living from farming are apt to condemn the practice, and many would even have it proclaimed as a punishable offence." He continues: "If practised with discrimination, it can be of great value in supplying livestock with more palatable feed." The pitfalls of burning and conditions under which burning is advisable are dealt with briefly but adequately.

More than a hundred well-captioned illustrations printed on art paper add greatly to the value of the book, in that they show the great range of types of grassland that occur in the world.

A fault is that the book is not free from errors. Portions with which the reviewer is familiar show several minor mistakes; for example, on page 92 "11 pounds" of white clover should read "1 pound".

The book is worthy of study by anyone concerned with grassland improvement, and in particular with poor grassland.

—S.H.S.

Leonard Hill Limited, London (published 1952). 10s. 6d.

◆

Grape Culture Bulletin

A very comprehensive bulletin on grape culture, Bulletin No. 354 "Viticulture", is now available from main offices of the Department of Agriculture at 2s. 6d. It has been prepared by F. Berry-Smith, the Department's viticulturist, and should prove indispensable to commercial growers.

Though the bulletin is intended primarily for commercial producers, it also contains much information which will enable home gardeners to cultivate vines successfully.

There is a comprehensive section on varieties, in which wine making and dessert qualities and relative tolerance to unfavourable weather during the maturity period are discussed. The bulletin, particularly the sections on grafting and training, is well illustrated.

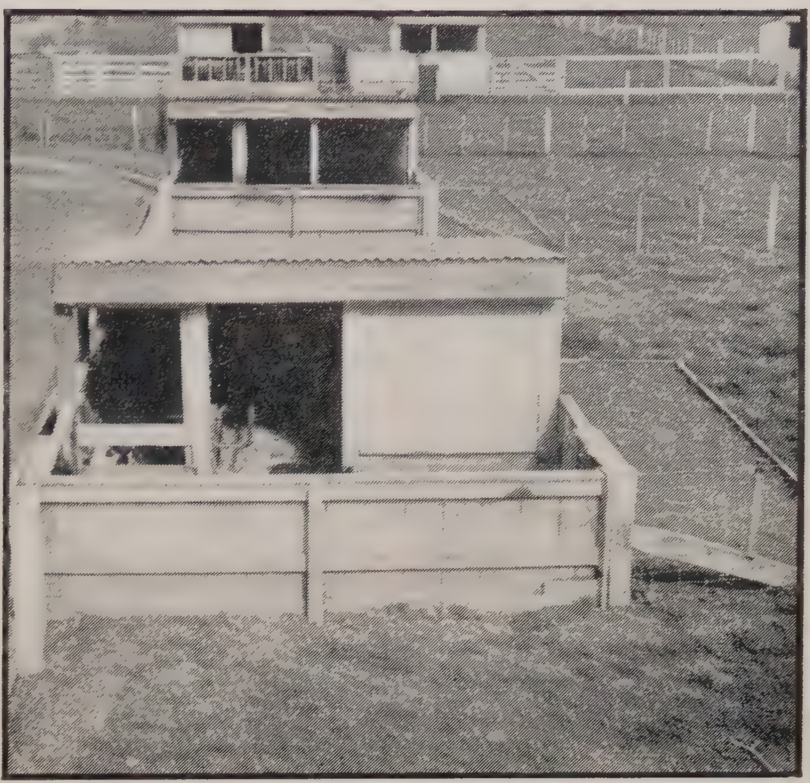
◆

The Feeding and Management of the Sow and Litter

THE aim in successful management of the sow and litter is the maximum of pig meat from each sow by the production of two heavy litters a year and heavy individual pigs. The dairy farmer has done much toward increasing his efficiency by the recognition of "standards", and comparable standards can be laid down for sow management: A profitable cow produces 300lb. of butterfat a year; a profitable sow produces 300lb. of pig meat a litter at weaning twice a year. In this article the more important management influences are discussed by C. P. McMeekan, Superintendent, and D. M. Smith, Research Officer, Department of Agriculture Animal Research Station, Ruakura.

CONTRIBUTING toward a heavy weight of pig meat from each litter are two factors—the number of pigs in the litter and their average weight at weaning. Though the great advantage of heavy weaners in relation to rapid fattening has been demonstrated in New Zealand, it should be clear that 10 pigs averaging 30lb. are of greater value to the farmer than 8 pigs of 40lb. Naturally, 10 pigs of 40lb. are of even greater value, but the first need is a large number of pigs per litter, and feeding and management should be designed to assist the sow to farrow and wean the greatest possible number. Once a litter has been born successfully, feeding and management can be concentrated on enabling each piglet to reach a high weaning weight.

That the standard quoted is practical is clear from the average results obtained from litter recording of commercial dairy farmers' herds in the Manawatu district in a 3-year period. More than 400 litters were recorded with the results shown in the table below. But it is also obvious from these results that efficiency varies greatly, and much of this variation is the result of management differences.



A Ruakura farrowing unit with the front closed for farrowing. A covered creep is on the left-hand end, and a gate at the right enables sow and litter to be confined to the house or allowed a run-out on pasture.

Mating

Sows should not be mated until they are 8 months old, and even then they must be well grown—at least 230lb. liveweight—if mature size is not to be reduced. Boars should not be used for service until they are about the same age, and then only sparingly during their first season.

When mated the sow should be fit but not fat, as overfatness is frequently the cause of small litters and of difficulty in getting sows in pig. That is not normally a problem with older sows, which usually are anything but fat after they have finished weaning a litter and are ready to be mated again, but it is a point which must be watched in young sows and in older sows which fail to get in pig on the first service after weaning. Sows come in season from 3 to 5 days after weaning a litter, and they must be mated successfully then to produce two litters a year.

LITTERS ABOVE AND BELOW 300lb. AT 56 DAYS OF AGE

	Number of litters	Average number born alive	Average number weaned	Average litter weights (lb.)			
				at 21 days		at 56 days	
				Total	Per pig	Total	Per pig
Below 300lb.	212	8.8	6.7	80	11.2	236	35.1
Above 300lb.	199	10.6	9.3	115	12.3	368	39.7
	411	9.6	8.0	100	12.1	295	37.0

In the virgin sow heat periods occur every 3 weeks once sexual maturity is reached. Sows remain in season for 2 to 3 days, and mating is more successful and results in larger litters if it is carried out on the second or third day. A good method is to mate on the second day as a regular practice and again on the third day if the animal is still in season.

Effect of Feeding on Sows

Failure to feed adequately is a common cause of failure of sows to hold to service. Much experimental work has been done on the relation of sow feeding to litter numbers, but results have been disappointing, failing to establish the importance of feeding at any special time during the period from before mating to farrowing.

Only one factor has been clearly demonstrated: Sows that are in very poor condition after weaning because of a low level of feeding at some previous time often fail to conceive at all. More pigs will be farrowed from a herd of sows which are fed at the recommended levels during the whole of their breeding life.

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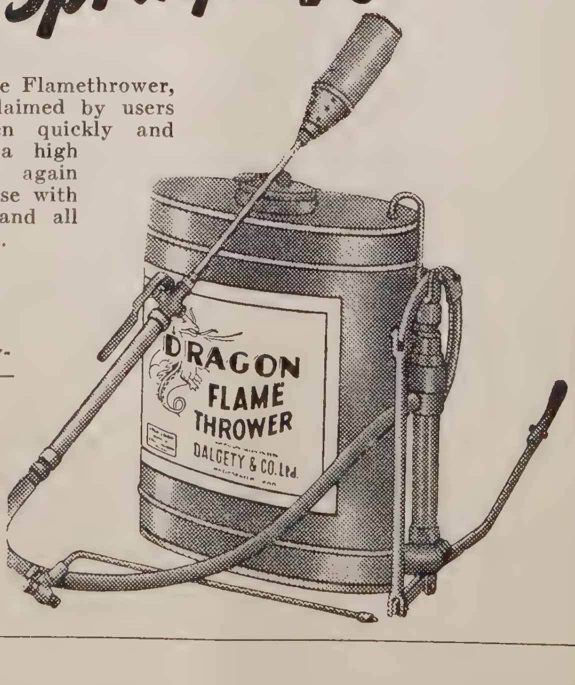

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Boars should not be run with the sows if that can be avoided. As with most classes of stock, individual mating gives more consistent results. In any case, running the boar with the sows does not permit efficient control of farrowing, as reliable dates of service and, therefore, dates of farrowing are not known.

Pregnant Sows

The sow should be brought to farrow in good fleshy condition; she should be neither too fat nor too thin. A high level of nutrition of the sow has been shown to be associated with a high birth-rate and strong, well-formed, vigorous piglets. It also affects the subsequent rate of growth of the litter by stimulating the sow's milk yield. Ideally, therefore, she should be well fed throughout her pregnancy of 16 weeks.

In practice, on the average dairy farm most sows are turned out to graze on dairy pastures after mating. That method of management is very sound, as pasture can contribute substantially to the maintenance of the sow and reduce the necessity for supplementary feeding, but it is unsound if no additional feed is provided. Investigations at Ruakura Animal Research Station have demonstrated the necessity for supplementing pasture with other food for at least a few weeks before farrowing. Such additional food can be provided either by dairy by-products, when they are available, or by bought concentrates and roots during winter.

Depending on the condition of the sow and the quality of the pasture, it is advisable to feed her from 2 to 5 meal units a day in suitable form. When by-products are used, they should be fed at the rate of from 2 to 5 gallons of separated milk daily; on a cheese farm from 3 to 7 gallons of whey is adequate if it is supplemented with from 1 to 2lb. of meat meal daily.

During winter the ration can be made up by the combination of roots and concentrates. A maximum of 30 to 40lb. (3 to 4 meal units) of roots should not be exceeded, and the amount of concentrates required to supplement this depends on the total amount of extra feed needed. As a general guide, about half of the supplements used should consist of meat meal, which, being rich in flesh-forming proteins, is especially useful to the pregnant animal and is needed because of the protein deficiency of roots. Any of the grain concentrates or grain by-products can make up the balance of the diet.

The condition of the sow should be watched carefully throughout pregnancy and the feed altered when necessary. The aim of feeding and management should be to provide the sow with a rising level of feed, so that she improves in condition after mating. The level of feeding should rise similarly before farrowing so that she is also improving at that time.

General management is not difficult. Pregnant sows thrive better under open-air conditions than inside, provided that adequate shelter is available for use at night and during rough weather.

Shortly before farrowing, the sow should be taken into her farrowing quarters, which should have a good grass run attached. That will accustom her to the farrowing house and permit control of farrowing. She should be handled frequently at this time so that, should it be necessary, assistance can be given without trouble and nervousness on her part. Good quiet sows, accustomed to being handled, are always an advantage. They usually have lower death-rates in their litters during the few critical days after birth, when the piglets are too small to look after themselves. Nervous, irritable, or excitable sows frequently kill quite a substantial proportion of their litters through overlying.

The Farrowing Unit

The house in which the sow is to farrow and raise her litter must be warm, dry, and easy to clean, and must allow complete control of the sow and her progeny. Control is the essential feature.

The trend in farrowing accommodation of recent years has been toward concentrating the houses as close together as adequate grass run-outs will permit and placing the sties against a convenient feeding race. That enables the farmer to feed his sows more easily and to have all his stock under observation at each feeding time. The layout should combine the advantages of both the "indoor" and "outdoor" systems, the sow and litter being confined in wet weather when they will damage the pasture and allowed out in the fine weather to obtain the benefit of grass and sunshine.

In the designing of the individual units account must be taken of the fact that young piglets require an air temperature of about 75 deg. F. In current housing plans, including that of the Ruakura unit illustrated on page 313, the fact that the most convenient and cheapest method of warming pig houses is to allow the stock to do the job themselves is ignored.

If this warming is to be done satisfactorily, the air space enclosed in the house must be reduced to about 160 cub. ft. and removal of the warmed air by excess ventilation must be closely controlled. In hot weather the most efficient method of cooling the sow or fattening pig is by a spray of water or a concrete wallow.

Though present house designs such as those available in current bulletins provide adequate control of the sow and litter and are convenient to clean and can be relatively draught free, their air capacity of approximately 360 cub. ft. does not enable temperature to be adequately controlled in spring.

The placing of the creep in relation to the farrowing house is important. It must be close to the sleeping quarters, so that the suckers can have access to the milk and meal provided without undue discomfort from adverse weather or the mud accompanying it. The growth of the sucker and its weight at weaning depend largely on the food consumed in the creep, and therefore the habit of visiting the creep frequently must be developed and encouraged. A covered creep is an advantage not only because the pigs use it more readily in wet weather, but because the danger of digestive upsets through meal, especially meat meal, becoming wet and putrefying is lessened. The grass run-out should consist of about ⅛ acre of good-quality pasture. The Ruakura farrowing unit illustrates all these points.

Early transfer to farrowing quarters so that special feeding can be given in preparation for farrowing is also important. The sow should be on a rising plane of nutrition at this period to stimulate the development of her milk-secreting glands.

Like all pregnant animals, she is subject to constipation at this time. That may have serious results on the health and growth of the young pigs, as such trouble in the sow is frequently passed to her litter, quite apart from difficulties which this condition may produce during farrowing. Bran is a very useful food, and from 1lb. to 2lb. daily in the ration usually prevents any difficulty, as it is laxative and stimulating as well as palatable. Molasses may also be used. A suitable mixture at this time is equal parts of bran, molasses, crushed barley, and meat meal. If constipation occurs, a laxative should be given, and for this purpose oil is more suitable than salts.

Fresh water should be available to the sow at all times, even if milk and whey are fed.

Farrowing

Signs of farrowing are readily observed even by the inexperienced pig breeder. From 1 to 2 days before farrowing most sows begin to make a bed, using all the rubbish and material they can collect. At about the same time the vulva begins to soften and enlarge and the udders start to swell. Shortly before farrowing is due, milk can be squeezed from the teats. It is important not to feed the sow heavily on the day of farrowing; she should be given only a small amount of food in a very liquid form.

The sow should farrow inside, especially in winter and spring. Farrowing outside often results in heavy mortality in the young piglets. Bedding may be provided, but not in large quantities. Excessive bedding—straw or hay—increases the danger of piglets becoming covered or overlain. For the same reason hay is not as suitable as short straw or wood shavings for this purpose.

The use of lamps to heat specially railed-off areas, which can be generously heaped with bedding, with the object of attracting the newly born pigs into a warm, comfortable retreat well clear of the sow, will help to reduce losses both from chilling and from overlying.

Assisting Newly Born Pigs

If possible, the sow should be allowed to farrow by herself, as most sows dislike the presence of man at that time. However, it is advisable to be near at hand so that assistance can be given if required. For example, it may be necessary to assist in the process of birth. More often the loss of piglets which wander away from the mother can be prevented by seeing that each has a drink and is contented and reasonably safe. Losses through overlying when the sow changes position while farrowing can also be prevented by a man near at hand. The

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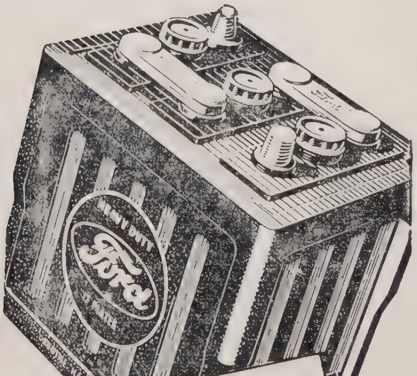

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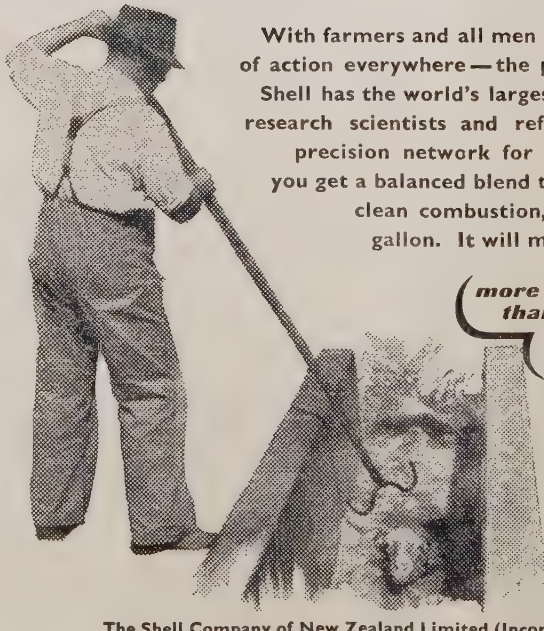

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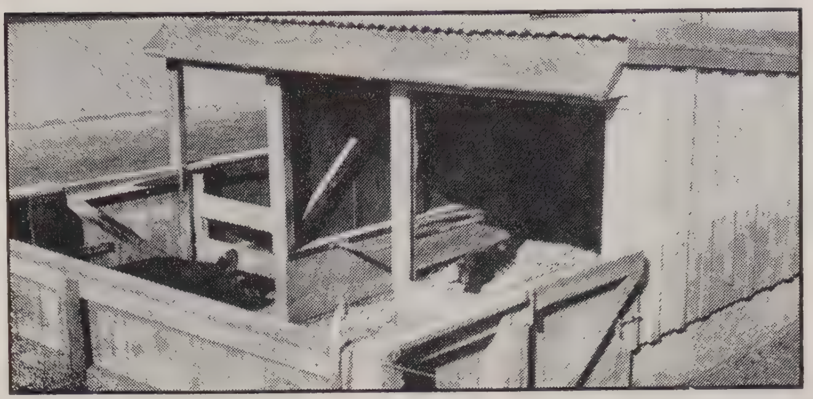


A Ruakura farrowing unit with the front open.

newly born pig is often not strong enough to look after itself, and a farmer present at this time can prevent many losses.

The lives of some piglets that apparently are born dead may also be saved. When it is born the young pig must first establish normal breathing to remain alive. Its mouth and nose are often blocked with film or slime, making breathing difficult or impossible. Speedy removal of this and assistance by massage or inflation of the pig's lungs may save the animal.

Management after Farrowing

For the first 3 or 4 days after the sow has farrowed feeding should be light, care being taken to keep the bowels working freely. A laxative ration should be used. Feed should not be forced, the amount being increased gradually until by about the fourth day the sow is receiving as much as she can consume comfortably.

Sows should be rationed according to the number of pigs being suckled. A good general guide is to use the meal-unit system (counting 1 gallon of separated milk, 2 gallons of whey, or 1lb. of meal as 1 meal unit) and allow 4 meal units for the maintenance of the sow and 2/3 meal unit for each piglet. Thus a sow suckling a litter of 9 pigs should receive 10 meal units a day.

On the separated-milk farms where the sow has access to good grass pasture this mixture could be made up conveniently and effectively with 7 gallons of separated milk and 2lb. of meal daily, allowing for 1 meal unit from grazing. Suckling sows should be fed 3 times daily, so that the ration at each feed would be 2 gallons of milk and 2/3lb. of meal. If milk supplies are ample, up to 10 gallons a sow can be fed and concentrates reduced proportionately.

On the cheese farm using whey, a sow and litter of 8 pigs should be fed 12 gallons of whey, plus 4lb. of meal if the meal used is mainly meat meal.

These standards are based on the most recent work at the Ruakura experimental piggery.

Suitable mixtures for feeding with separated milk and whey are:—

FOR USE WITH SEPARATED MILK

	lb.
Crushed barley	50
Meat meal	25
Pollard	12½
Bran	12½
Total	100

FOR USE WITH WHEY

	lb.
Bran	30
Crushed barley	30
Meat meal	40
Total	100

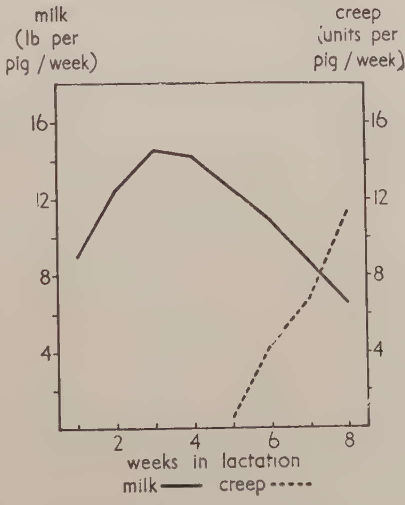
If pollard and bran are unobtainable, they may be replaced by barley.

In these mixtures the bran is particularly valuable to the milking sow both to stimulate milk production and to prevent constipation. (Though there are no experimental data to support the contention that bran stimulates milk production, extensive field experience lends support to it.) The feeding of excessive quantities of milk or whey should be avoided, the amounts mentioned being the maxima advisable.

Where neither milk nor whey is available roots may be fed to provide part of the bulk and to add succulence to a concentrate meal ration. A maximum of 40lb. daily of roots of the carrot, sugar beet, or mangold type should not be exceeded. That quantity is equivalent to 4 to 7 meal units in food value, depending on the type of root used. (Six to 10lb. of roots equal 1 meal unit.) The balance of this bulk diet must be adjusted by a suitable concentrate mixture such as that listed for use with whey.

Feeding should be regulated not only according to the size of the litter, but also according to the condition and performance of the sow. The rations mentioned are only guides. As with all classes of stock, the judgment and experience of the feeder must be called on to decide whether the feed used is producing the desired results. Supplementary feeds cost money, and their use must be closely watched and wasteful methods avoided, but a sow must be fed on a good milk-producing ration. The use of some meals is very desirable.

FOOD CONSUMPTION OF A LITTER



The consumption of meal from the creep increases as the milk yield of the sow declines.

Feeding of Litters

Up to 3 weeks of age the pig depends solely on the milk of its mother. After that it will take extra food, the provision of which is essential to the production of heavy piglets at weaning time. The milk supply of the sow begins to decline after 6 weeks, so farmers have developed what is known as the "creep" system of feeding. As part of the farrowing house or unit, a special area or pen called a creep is made available. The young pigs alone have access to it, and there special feed for the litter is placed.

For heavy weaning weights it is very important that the young pigs should be taught to take extra feed as soon as possible. Even though it is offered freely, they often take some time before they begin to investigate it. Efficient farmers adopt various practices to encourage early creep feeding. Perhaps the simplest is to confine the litter to the creep area, away from the sow, for part of the day, so that hunger and inquisitiveness lead to their sampling the food provided. Pollard or meat meal scattered on the floor of the house often helps. Once a start is made no further trouble is experienced.

The type of feed provided in the creep is important. Piglets usually will take dry feed before they begin to drink extra milk. Experience has shown that they will take to meat meal readily in this way, and as this material is both highly digestible and especially valuable in promoting rapid growth, it can well provide the main food in the creep. Liver meal is even better. These meals usually are best provided in a self-feeder. The mixing of a little pollard or finely ground grain meal of any type with the meat meal is a good practice. As soon as the pigs start to eat readily, separated milk should be provided in a small trough in the creep.

The quantity of meal and milk fed in the creep can best be decided by the piglets. It is essential that both milk and meal should be present and available at all times.

Observations at Ruakura have shown that the piglets in the last 2 weeks on the sow visit the creep after every suckling. As litters suckle their mother approximately every hour to hour and a half throughout the whole 24 hours, merely providing a restricted creep ration three times a day will leave the piglets unsatisfied and reduce the possible growth rate and weaning weight.

For convenience some form of hopper which will hold a week's supply of meal and which keeps a constant supply in front of the piglets would prove most satisfactory.

Fed in the manner described, a good strain of pigs should have no difficulty in reaching an average weaning weight of 40lb. a piglet. That weight should be the aim of every progressive farmer.

Young pigs thrive better when able to graze good-quality, young, leafy pasturage, and farrowing units should be designed to give access to pasture as frequently as possible. On heavy, wet land, where pigs tend to convert a limited grass pen into a quagmire, the run-out on grass is best restricted to suitable weather, and on such country the farrowing unit should be of the type that will permit this. On free-draining, light country this problem does not arise and a permanent run-out is possible. The advantage of a grass run-out is mainly one of health. Pigs bred indoors, unless very carefully fed, are extremely difficult to keep thrifty, anaemia and scours often occurring. Pasture and the soil with which it is associated provide the young pig with essential vitamins and minerals. Exercise and sunlight also contribute to the maintenance of health. However, coarse, rank pasture is useless to pigs.

Castration

Boar pigs are best castrated while they are still suckling the sow. A good age is 4 to 6 weeks. The animals being small, the operation is easier to carry out then than later, and recovery is more rapid if the piglets are still on the mother.

Castration is an operation which can be learnt only by demonstration and practice. The procedure is described and illustrated in Bulletin No. 230, "Castration of Pigs", which is available free from any office of the Department of Agriculture.

Faulty castration, resulting in the development of abscesses at the site of the wound or in nearby glands, causes considerable loss to the industry. Piglets may die from the result of infections or, at best, produce carcasses which ultimately are condemned at slaughter. Cleanliness in carrying out the operation, cleanliness of quarters to which the pigs are returned after castration, and efficient execution of the operation are essential for successful results.

All boar pigs intended for fattening must be castrated to be acceptable as pork or bacon carcasses.

Weaning

Eight weeks is the best age at which to wean piglets. Some farmers wean litters at 6 weeks, but that is not advisable if the best results are desired.

Removing the sow, leaving the litter in its original quarters for a period, is a sound policy. By this method the young pigs settle down more readily and are not so subject to the setback most pigs receive for the first week or two after being weaned. Such a setback is less likely if the litter is accustomed to feeding readily from the creep and if it is managed in the manner suggested.

Eight weeks after farrowing, the milk flow of most sows ceases very quickly, and little trouble is experienced in this respect.

Breeding Life of Sow

After the litter has been weaned the sow will come in season again within a few days, and must be mated then if two litters a year are desired.

Sows will continue to breed profitably for eight to ten litters on the average. Exceptional sows may maintain large litter numbers for longer, but as a general rule retention of a sow past the eighth to the tenth litter is unwise. On an eight-litter basis the sow herd is replaced completely every 4 years, so a 25 per cent. annual replacement rate must be allowed for.

Key Points of Management

The key points in successful sow management where the object is two litters a year, each representing 300lb. of pig meat at weaning, may be summarised as follows:—

Hand mate the sow toward the end of a heat and feed her so that she improves in condition for the following month.

From then aim to hold the sow in good breeding condition until the last month before farrowing, when the feeding level should be raised.

Accustom the sow to being handled, and allow her to farrow in a well-designed layout which permits the use of both indoor and outdoor methods and which enables complete control of sow and litter.

The individual farrowing unit should be of sufficiently small cubic capacity to enable the sow to keep it warm on the coldest nights. If this is not possible, the house should be warmed.

Be present at farrowing, but give assistance only when necessary.

Feed a milk-producing ration proportionate to the size of the litter.

Both milk and meal should be constantly available to the litter in the creep after the piglets have reached 3 weeks of age.

Mechanical Inter-row Cultivation of Crops

WEEDS in row crops can be most conveniently handled mechanically by inter-row cultivators. These implements, available in several forms with a modern trend toward tractor-mounted types, move up between the rows and by a series or combination of knife, hoe, disc, and shovel attachments cultivate the soil in the inter-row spaces. The depth of working is variable and any weeds are either cut off below ground level or dragged to the surface and there die. This disposes of inter-row weeds, but those established within the rows may also be dealt with by suitably timed cultivation and/or by special cultivating attachments.

Pre-emergence cultivation using flat, knife cultivators suppresses both potential inter-row and in-row weeds. In established crops special tools may be employed either to comb out weeds growing between crop plants or by flicking them out with rotating fingers that work at right angles to the direction of travel. At a more advanced stage of crop growth it may be possible to smother out small, in-row weeds by earthing up with shovels or discs set upright and drawn at a judicious speed. This practice should not be used where crop plants are themselves liable to smothering by such treatments.

Many Types Available

Most manufacturers now produce inter-row tool bars and a wide range of cultivating tools for their row-crop model tractors. The width of the tool bar is governed largely by the power of the tractor and the convenience of handling as many rows as possible with one stroke of the machine. Two-, four-, and six-row models are commonly employed.

Older models were manually operated, but recent forms are more conveniently raised and lowered by hydraulic lifts or are powered from the tractor motor. Most manufacturers now place the tool bar under the centre of the tractor, where it is in full view of the operator. This is a decided advantage over rear-mounted or trailed cultivators in that crop damage can be more easily avoided. Special small tractors with rear-mounted motors have also been developed to give the operator an unrestricted view of his work.

To facilitate and ensure satisfactory inter-row cultivation crops must be drilled evenly and straight, with sufficient headland allowed for turning without damage to the crop.

With the excellent equipment available weeds in crops can be successfully controlled to conserve soil moisture and plant nutrients for the betterment of the intercultivated crop. Once the ground is free of weeds, however, subsequent cultivation will not conserve soil moisture, and an implement used with that intention might just as well remain in the shed.

—*C. J. CROSBIE,*
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Department of Agriculture,
Christchurch

SUBSCRIPTION RENEWALS

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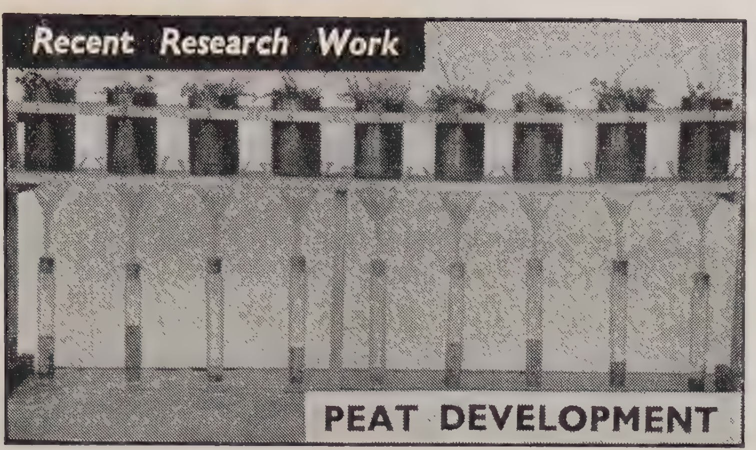
Recent Research Work



PEAT DEVELOPMENT

IN addition to the various field trials on the development of peat at the Department of Agriculture Soil Research Station, Rukuhia, a considerable amount of research and chemical work is being carried out at the station's laboratory. This laboratory work provides a basis for and supports the results of the field trials.

LOSSES OF NUTRIENTS IN DRAINAGE

LOSSES of plant nutrients through leaching of peat by rain are being measured by analyses of the drainage water collected from lysimeters. The experimental set-up, which is illustrated on page 9 of the January 1952 issue of the "Journal", consists of cylinders 18in. deep filled with peat on which pasture was sown after topdressing with lime, phosphate, and potash. The quantities of nutrients, expressed in terms of the corresponding fertilisers, in the drainage for 12 months are as follows:—

	lb. per acre		lb. per acre
Calcium carbonate ..	50	Nitrate of soda	15
Magnesium carbonate	33	Superphosphate	Trace
Muriate of potash ..	38		

These quantities are very similar to those obtained in the drainage from Hamilton clay loam, except that the potash in the peat drainage is about 10 times more than that from the clay loam. The peat was topdressed with potash whereas the clay soil was not. The leaching of potash in the peat lysimeters was no greater where the water levels were maintained at 6in. from the surface than where they were maintained at 15in.

POTASH LEACHING

IN view of the above results further experiments are being conducted to obtain more information on the leaching of potash from the surface layers. Cores of turf 4in. in diameter are being watered at various rates and the drainage is collected as shown in the illustration.

In one trial using turves 6in. deep which had been topdressed at the rate of 2cwt. of muriate of potash per acre the recovery of potash in the drainage was equivalent to 25lb. of muriate per acre in 10 weeks, during which the turves were heavily watered. There was very little potash in the drainage from the cores topdressed with 1cwt. of muriate per acre.

However, in another trial with turves only 3in. deep there was a considerable amount of potash in the drainage after topdressing with 1cwt. of muriate, particularly at the heavier rates of watering. In one instance there was 6lb. of potash per acre in the drainage in 1 week. These results, which are preliminary only, indicate that under experimental conditions there is appreciable downward movement of potash in peat, particularly with excessive watering after heavy rates of topdressing. The experiments are being continued to measure the leaching under moisture conditions more closely related to those which occur in practice.

Because of the possibility that winter rains might leach potash out of the surface layers of peat, it has been advocated on theoretical grounds that it is better to topdress with potash in spring than in autumn. The farmer cannot always obtain potash when required, and when more information is available he will be better able to choose between the inconvenience of storing potash on the farm and the probable losses from leaching if the potash is applied before winter.

Results with Horotiu sandy loam show that only negligible quantities of potash are recovered in drainage even after topdressing with 2cwt. of muriate per acre.

PEAT LIMING

A FARMER applied 2 tons of lime per acre together with phosphate and potash when sowing pasture on raw peat. The sowing was a complete failure. No samples of the peat were taken for analyses before sowing, but subsequent samples showed that adjacent unlimed peat was much more acid than usual. The pH was 3.6 compared with figures about 4.0 for most raw peat. Applications of 2 tons of lime per acre are quite inadequate for peat of pH 3.6, and 4 tons or more would be required before good pasture establishment could be expected. Drainage and fallowing with intermittent cultivation over at least a year should help to reduce the acidity (that is, increase the pH) so that more moderate applications of lime would be adequate. However, experimental data on this point are not yet available.

Other instances have since been recorded of raw peat of about pH 3.6 Apart from farmers' experiences such as that quoted, soil analysis appears to be the only method of determining whether any particular area of undeveloped peat is in that extremely acid category or whether it is of average acidity, which would enable pasture to be established with 1 or 2 tons of lime per acre.

PEAT WITH "RED" ASH

FARMERS' experiences have also shown that in some instances undeveloped peat can be sown down successfully in pasture without any lime or fertiliser. On the other hand, in the experiments at the Soil Research Station the omission of either lime or fertiliser resulted in a very poor pasture. The explanation of the different results lies in the fact that whereas the raw peat used for the experiments is acid and of low mineral content and appears typical of the undeveloped peat in the Waikato and Hauraki Plains, there are local areas of undeveloped peat which are much less acid and have a higher content of available plant nutrients. The latter peat burns to a "red" ash compared with the "white" ash of average peat. The higher fertility of the red ash peat is indicated by the following results of analyses from untopdressed areas:—

	pH	Phosphate
White ash peat	4.6	low
Red ash peat	5.7	high

MOISTURE IN PEAT

THE maintenance of high water levels in peat during summer is repeatedly advocated. The reason this is so much more important on peat than on mineral soils is that plants cannot obtain sufficient water from peat for good growth unless the peat is kept very much wetter than is necessary for mineral soils. The explanation is that, although peat may hold a much higher percentage of water than mineral soils, it holds water more tenaciously and therefore has a much higher wilting point. Also the dry weight per acre of peat is very much less than that of mineral soils, and even when peat is wet the amount of water available to plants per acre is less than that from a clay soil. The differences between the two types of soil are shown by the following figures.

Available water in top 4in. of peat and mineral soils

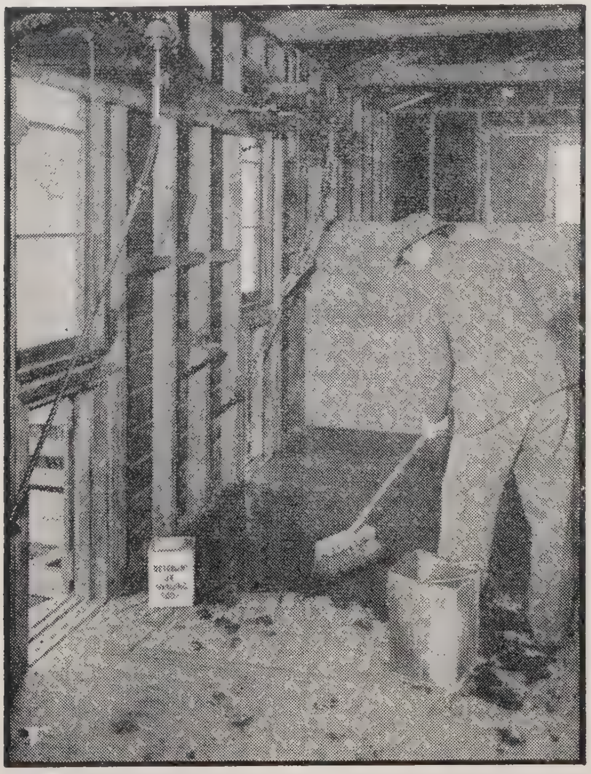
Soil type	Field capacity	Wilting point	Available water	Dry soil	Available water
	per cent.	per cent.	per cent.	lb. per acre	lb. per acre
Peat ..	130	50	80	325,000	260,000
Peaty loam	110	35	75	400,000	300,000
Clay loam	55	20	35	1,000,000	350,000

Furthermore, laboratory studies in which moisture losses in summer were measured by weighing pots of both peat and clay loam have shown that the losses from peat were greater. Similar results were obtained when the pots had either pasture or bare ground on the surface.

—*F. B. THOMPSON*

Care of Livestock during November

Contributed by the Animal Research Division



SHEARING PREPARATIONS

PREPARATIONS for shearing should be made now. Attend to sheepyards and scrub out the woolshed. This will reduce trouble from such diseases as blood poisoning, tetanus, and caseous lymphadenitis ("lympho") after shearing. Check over all machinery to see all parts are in good working order. Dag all dirty sheep and shear hoggets, wethers, dry ewes, and rams. When culling sheep before shearing pay particular attention to teeth, udder, and dropped belly. On fat-lamb farms ewes are best shorn after one or two drafts of lambs are away.

DRY EWES

If dry ewes have not already been removed from the flock, they should be separated immediately. It is a good plan to shear them and, during shearing, they should be inspected carefully for udder abnormalities. All ewes whose udders were empty at lambing and ewes with diseased udders, damaged teats, very large teats, very small teats, or badly placed teats should be culled. Dry ewes with defective mouths and old ewes which did not have a lamb this year should also be culled. Dry ewes which are retained should not be allowed to get too fat during summer. If kept in hard store condition, they are more likely to hold when mated next autumn.

DIP RAMS EARLY

Rams should be dipped before they begin to flush, preferably before Christmas. Flushed rams sometimes scald after dipping.

HILL STATIONS

Where bidi-bidi comes away early, and is troublesome, ewes should be shorn toward the end of this month. Cull run cows not required for breeding. Brand calves and handle them as opportunity permits. In warmer districts put bulls out with the breeding herd. Where water is not laid on attention should be given to dams and springs so that water supplies will be plentiful during the hotter weather.

CONTROL OF FAT-LAMB PASTURE

Pastures on which ewes and lambs are grazing should never be allowed to become rank. If pastures are getting too long, they can best be controlled by cattle. Yearling beef cattle soon become quiet and they can then be run with ewes and lambs even in small paddocks.

CARE OF PIGS

Dry sows should have access to good pasture, and in addition should receive from 2 to 4 gallons of milk per day, depending on their condition. They should be kept thriving, but should not be allowed to become too fat. Keep only as many of the spring litters for baconers as can be fed adequately. The remainder should be sold as porkers.

VACCINATION AGAINST CONTAGIOUS ABORTION

Vaccination has reduced the New Zealand average rate of abortion in dairy cows from about 5 per cent. to about 1 per cent. There are, however, still too many dairy farmers who do not have their calves vaccinated. Past freedom from abortion is no excuse for not vaccinating, as infection may be introduced into a herd at any time. Although vaccination does not start until January or February, application for vaccination should be made early, as Veterinarians and Inspectors of Stock have to plan their vaccination itineraries, and late applications make this very difficult.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during August, with comparative figures for the same month of 1951, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER

Month	Creamery	Tons Whey	Total	Percentage inc. or dec.
August 1952	8,939	105	9,044	—
August 1951	8,883	113	8,996	—
Increase or decrease ..	+56	—8	+48	+0.533

Butter in store at 31 August 1952 was 8667 tons

CHEESE

Month	White	Tons Coloured	Total	Percentage inc. or dec.
August 1952	1,343	—	1,343	—
August 1951	1,656	—	1,656	—
Increase or decrease ..	—313	—	—313	—18.900

Cheese in store at 31 August 1952 was 1713 tons

If these figures are converted into butterfat equivalent, there is a decrease of 0.943 per cent. in butterfat graded for August as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Pasture and Lucerne Hay; the Pea Crop

Seasonal Notes by the Extension Division

PREPARATIONS for pasture and lucerne haymaking should be put in hand as soon as possible. Haymaking machinery should be checked over and put in order before the rush of harvest work begins. Increased production could be secured from large areas of light land in the lower-rainfall areas through the establishment of lucerne stands for hay and grazing.

LUCERNE IN CANTERBURY

ALTHOUGH there has been a substantial increase in the area of lucerne in recent years, there is still scope for a very much larger acreage of this valuable crop in Canterbury. Apart altogether from its value as winter fodder in the form of hay and silage, lucerne is now filling a very useful place in supplying grazing on fat-lamb-producing properties when standard pastures are giving insufficient feed to meet stock requirements. Lucerne will grow on a wide range of soil types, but it gives best results on fertile, free-working loams. Where fertility is low the growing of crops such as rape, turnips, and greenfeed will pave the way for rapid establishment of a good lucerne stand. On weed-free land there is much to be said for spring sowing. Soil moisture is usually in plentiful supply about the end of September and if seed is sown at that time, the young plants develop a strong root system before dry weather sets in. In localities where weeds are likely to be troublesome best results will be obtained by sowing about the end of January after a summer fallow. Sowing rates vary from farm to farm and satisfactory establishment depends more on climatic conditions and thoroughness of seed-bed preparation than on rate of seeding. The usual rate is 12lb. to 15lb. per acre and although, under ideal conditions, as little as 8lb. per acre may prove ample, the heavier rate is recommended. Nitrogen-fixing bacteria are essential to the normal growth of lucerne and these are supplied in a culture placed in contact with the seed. Most growers appreciate the value of culture, but sometimes its effect is offset by incorrect treatment. The most satisfactory method of sowing is to mix thoroughly the culture-treated seed with reverted superphosphate and drill through every coulter of the grain drill.

—*E. G. SMITH*

* * *

HAYMAKING

GOOD hay, whether made from pasture, lucerne, or any other suitable crop, is a palatable, nourishing food, well liked by cattle, sheep, and horses. Good hay is not easy to come by, however, and much of the 500,000 acres saved annually in New Zealand for hay produces material which is neither palatable nor nutritious. It is in fact too often very poor hay. To make good hay the raw material must be good in the first place, it must be cut at the right time, it must be properly cured before stacking or baling, and to keep it good it must be properly stacked or stored to protect it from the weather. All these things are essential to the making of good hay.

RAW MATERIAL AND TIME TO CUT

Certain crops such as lucerne, oats, or oats and vetches are good material in themselves, but they must be cut at the right time to make good hay. Lucerne should not be left till the stalks get hard, oats should be cut when the grain is still milky, and vetches while the pods are still green. Quality rather than quantity should be the guide. With pasture, which provides the bulk of our hay, good raw material is also essential to a good product. Weeds and poor grasses can never make good hay. Mixed clover and grass pastures should be cut when the main grass is coming into flower; pure clover stands can be left until the clover is in full flower. Here again the quality of the material should not be sacrificed for quantity and the harvesting of leaf rather than stem should be the aim. There is nothing better for making good hay than vigorous, quick-growing pasture, and paddocks intended for the hay crop should receive special attention. Give a good clean up with stock, harrow to spread droppings, and follow with topdressing, using a quick-acting phosphate such as serpentine superphosphate plus some potash or nitrogenous manure if either of these has been found to be beneficial in getting more vigorous growth. There is no advantage in early closing if dependable haymaking weather is late in the district.

CURING AND STORING

The making of good hay is very dependent on the weather. The method is to try to have the crop at the right stage for cutting when the weather is most likely to be right too. When the weather is right no time should be wasted in getting the crop cut, cured, and safely stacked or stored. Bright sunshine is not essential to the proper curing of hay. In fact sun drying is bad for hay and causes big losses in leaf and in quality. The best curing agent is the wind, and really good hay can be made on dull, windy days providing the material is lifted frequently and turned so that the wind can pass freely through it. The swath should be lifted and turned soon after it is cut. A good practice is to lift and turn the morning cut the same afternoon and the afternoon cut the following morning, giving the first lot another turn that afternoon. In good haymaking weather the crop should be ready for baling or stacking in less than 2 days after such treatment. It is not much use having good material, getting it properly cured and made into good hay, and then through careless stacking or neglect to protect the bales to lose a big portion of it before it is required to help feed hungry stock. Be prepared to cover stacks and to get bales in out of the weather. If no shed is available, see that they are properly stacked and securely covered before rain, the arch-enemy of good hay, has a chance to spoil them.

—*E. M. BATES*

* * *

PEA CROP

PEAS are best taken after grass, as soil conditions are then most suitable and weed infestation is less likely than after crops taken later in the rotation. Factors governing the selection of type and variety of pea to be grown cover not only soil conditions, but also expected demand (normally covered by the contract system). Field peas are usually grown on the lighter lands and garden peas on the more fertile areas. Of the garden varieties Greenfeast (Lincoln) is the hardiest and is likely to do well under less favourable conditions than any other garden variety. Its maturity is mid-season and it is most suitable for field conditions. Onward (Southern Cross) prefers heavier ground and under favourable conditions gives good yields. Foliage is more tender than Greenfeast with wider leaves and is more liable to wind damage in exposed positions. Maturity is mid-season. W. F. Massey (Kelvedon Wonder) is the most popular early variety: It is not suitable on the poorer soils, but gives good yields under high-fertility conditions. As with most quick-maturing plants, it does not relish a check during growth. In the field varieties Partridge is the most widely grown and can usually be depended on to give satisfactory yields. Marathon is very similar to Partridge, but is later maturing, and the seed can be distinguished by its black hylem. Blue Prussian is also an important variety and does well in some localities, particularly Blenheim, where stocks have been kept pure by discouraging the growing of other field varieties. White Ivory, Victorias, and White Prolific (white varieties) are grown on a very limited area and have never been as popular as other field varieties.

—*N. L. SHILLITTO*

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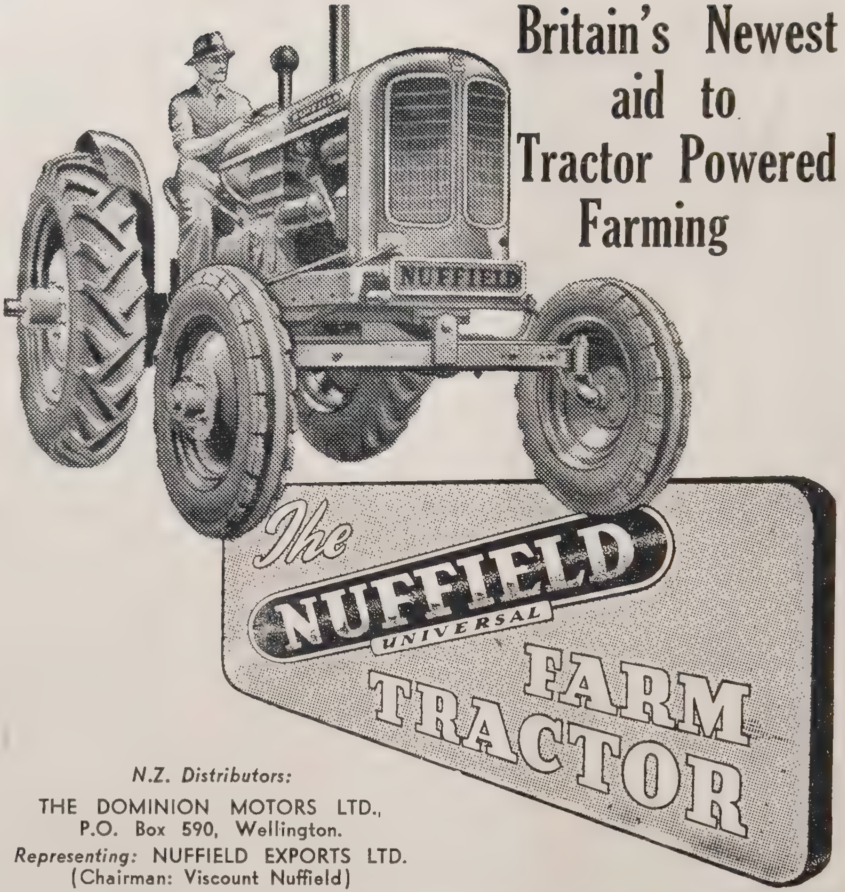

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Plant Injury Caused by Several Types of Hormones

SINCE the introduction and wide commercial use of hormone weedkillers many growers have learnt from experience that spray drift or vapour from such applications will cause serious damage to a range of plants and loss of valuable crops. The dangers of using hormone weedkillers close to crops have been stressed by writers, and here R. M. Davison, Plant Physiologist, Fruit Research Station, Department of Scientific and Industrial Research, Auckland, describes how plants may be damaged by hormone preparations other than weedkillers.

CERTAIN plants are particularly susceptible to injury, for example, tomatoes and grapes, and only extremely small amounts of 2,4-D, the commonest type of hormone weedkiller, are required to produce marked effects.

Weedkiller Damage

The symptoms of 2,4-D injury are fairly well known. On tomatoes damage is shown by twisted stems and narrow, distorted leaflets, with pointed projections and prominent, distorted veins (Fig. 1). Leaves are fern-like, giving the whole plant a spindly appearance not unlike a plant infected with cucumber mosaic. In severe cases the fruit that forms is often beaked and hollow and unmarketable, and the over-all crop may be reduced seriously in weight and quality.

Fruit-setting Hormones

An important point to note, however, is that if application is faulty, these symptoms can also be caused by commonly used hormones other than those of the weedkilling group; for example, beta-naphthoxyacetic acid, a hormone widely used for fruit setting of tomatoes, if used as an over-all foliage spray, will cause symptoms of typical hormone injury (Fig. 2). When hormone spray comes in contact with the top of the plant it modifies young expanding leaves of the growing point, and on subsequent growth distorted leaves appear. Evidence of hormone damage can often be found in glasshouses where a nozzle has been misdirected on to the top of a plant. Another fruit-setting hormone, parachlorophenoxyacetic acid, will also cause similar foliage damage if a water spray is applied to growing tips (Fig. 3).

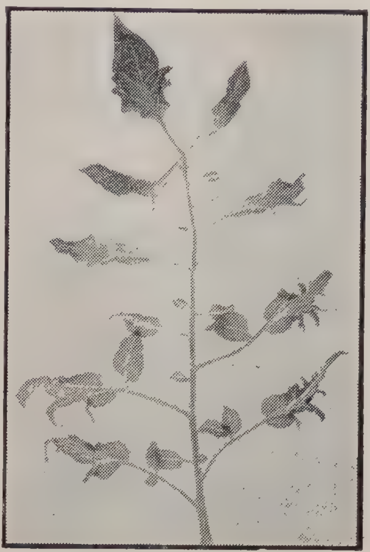

Fig. 2—Beta-naphthoxyacetic acid, a hormone widely used for fruit setting of tomatoes, if used as an over-all foliage spray, will cause symptoms of typical hormone injury.

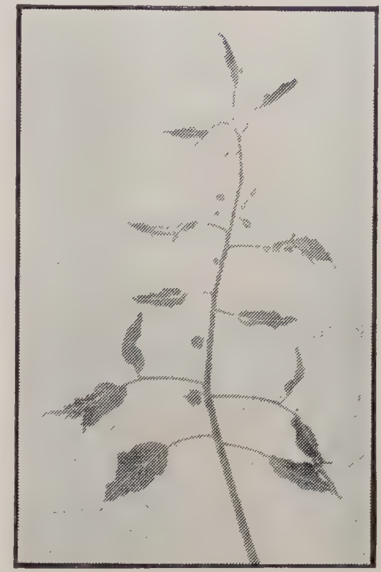

Fig. 3—Tomato foliage damaged by parachlorophenoxyacetic acid, a fruit-setting hormone, which should not be applied to growing tips.

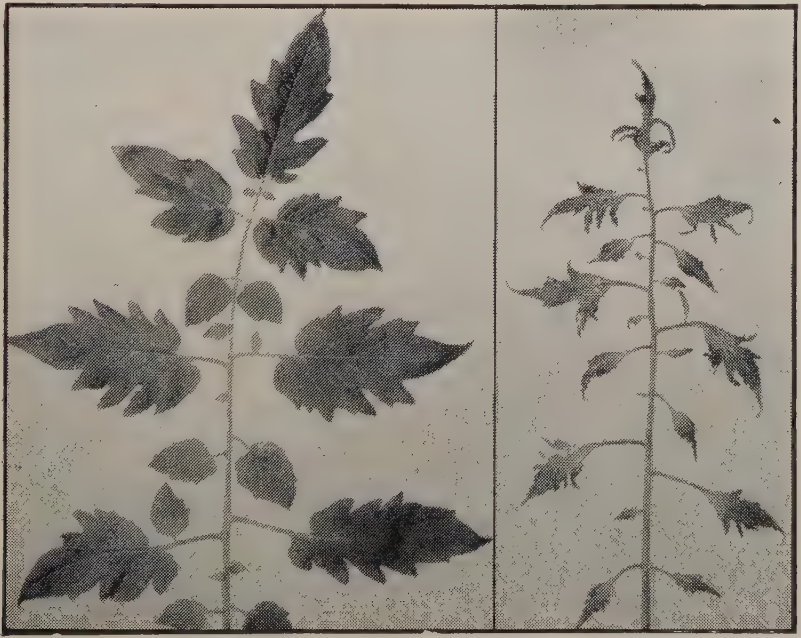

Fig. 1—Symptoms of 2,4-D injury on tomato plants. Healthy foliage (left) compared with damaged foliage (right).

Correct Application Essential

It must be emphasised, however, that both these fruit-setting hormones are quite safe provided they are applied at the correct dosage and in the recommended manner. If the preparation is applied as a water spray to the flower bunches only, no plant damage should occur. Equipment to be used for such "spot" spraying should not deliver a wide cone of spray, which may cause excess solution to reach the growing tips of neighbouring plants.

Similar Symptoms

Parachlorophenoxyacetic acid, when sprayed on to young grape shoots, will give marked leaf distortions which are indistinguishable from the injury caused by hormone weedkillers (Fig. 4). It should be noted that the injury follows the same general pattern; the veins become prominent, protuberances develop from the leaf edges, and a marked reduction in the leaf area occurs.

Hormone chemicals commonly used in gardens and on farms vary greatly in their power to induce shoot and foliage distortion. Some show little or no activity; others such as the fruit-setting hormones mentioned are moderately active, while hormones of

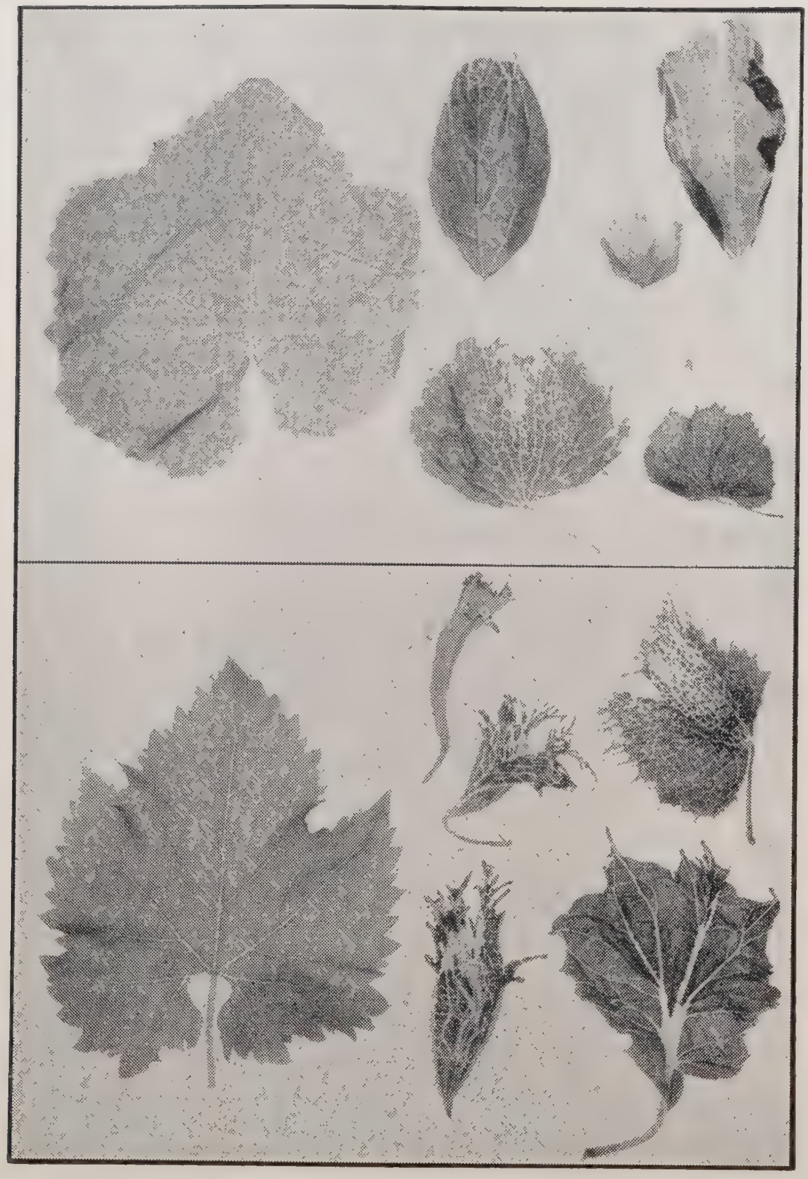

Fig. 4—Upper: Leaves damaged by parachlorophenoxyacetic acid (right); healthy leaf on left. Lower: Leaves damaged by 2,4-D (right); healthy leaf on left.

the weedkilling group are very potent even at great dilutions. It is this potency, and the fact that the weedkillers are used at very high concentrations, which makes them a potential danger when used near valuable crops.

Weedkiller injury is by far the most frequent type of accidental hormone damage encountered, but hormones used for other purposes are capable of producing similar effects. There is no known chemical analysis or biological test that can be used to determine which hormone has caused damage. The first step necessary to determine the cause of a particular hormone injury is to find out if any weedkillers have been used in the vicinity of the damaged plants. If none was used, other hormone treatments should be checked. Overdoses or incorrect applications of the latter may be responsible.

L. J. Matthews, Weeds Research Officer, Department of Agriculture, Wellington, comments that the danger of injury through spray drift to plant growth other than that to be controlled can frequently be avoided. Oil-based preparations which affect all woody species and contaminate spraying equipment are sometimes used in the home garden when the effect desired could be achieved, without danger to other species, by the use of the more selective water-based preparations of M.C.P. or 2,4-D.

Show Dates

THE following are dates and venues of A. and P. shows up to the end of January:—

October
*17 and 18 October—Poverty Bay A. and P. at Gisborne.
18 October—Ellesmere A. and P. at Leeston.
***22 and 23 October—Hawkes Bay A. and P. (Royal Show) at Hastings.**
24 and 25 October—Marlborough A. and P. at Blenheim.
25 October—Northern A. and P. at Rangiora.
30 and 31 October and 1 November—Waikato A. and P. at Hamilton.
31 October and 1 November—Wairarapa and East Coast A. and P. at Carterton.

November
1 November—Timaru A. and P. at Timaru.
*1 November—Amberley A. and P. (50th Jubilee) at Amberley.
*6 November—Ashburton A. and P. at Ashburton.
7 and 8 November—Manawatu and West Coast A. and P. at Palmerston North.
8 November—Tokoroa A. and P. at Tokoroa.
12 November—Thames Valley A. P. and H. at Te Aroha.
*12, 13, and 14 November—Canterbury A. and P. at Christchurch.
14 and 15 November—Wanganui A. and P. at Wanganui.
14 and 15 November—Whangarei A. and P. at Whangarei.
15 November—Taieri Agricultural Society at Outram.
15 November—Waihi A. and P. at Waihi.
19 November—North Otago A. and P. at Oamaru.
21 and 22 November—Egmont A. and P. at Hawera.
*21 and 22 November—Nelson A. and P. at Nelson.
22 November—Courtenay A. and P. at Kirwee.
22 November—Waimate A. and P. at Waimate.
22 November—South Otago A. and P. at Balclutha.
22 November—West Otago A. and P. at Kelso.
22 November—Bay of Islands P. and I. at Waimate North.
25 and 26 November—Otago A. and P. at Dunedin.
27, 28, and 29 November—Auckland Metropolitan A. and P. at Auckland.
*28 and 29 November—Stratford A. and P. at Stratford.
29 November—Kaikohe A. P. and H. at Kaikohe.
29 November—Motueka A. and P. at Motueka.
29 November—Tokomairiro A. and P. at Milton.
29 November—Winton A. and P. at Winton.

December
*2 and 3 December—Gore A. and P. at Gore.
6 December—Whangaroa A. and P. at Kaeo.
6 December—Hauraki A. and P. at Paeroa.
6 December—Helensville A. and P. at Helensville.
6 December—Wyndham A. and P. at Wyndham.
*9 and 10 December—Southland A. and P. at Invercargill.
13 December—Otago Peninsula A. and P. at Portobello.

January
10 January—Blueskin A. and P. at Waitati.
10 January—Rotorua A. and P. at Rotorua.
16 and 17 January—Wairoa County A. and P. at Wairoa.
17 January—Waikouaiti A. and P. at Waikouaiti.
*24 January—Central Hawkes Bay A. and P. at Waipukurau.
24 January—Palmerston and Waihemo A. and P. at Palmerston.
*27 and 28 January—Feilding A. and P. at Feilding.
*30 and 31 January—Horowhenua A. and P. at Levin.
31 January—Waiau A. and P. at Tuatapere.

* The Department of Agriculture exhibit will be staged at this show.

Sweet Corn Culture

By S. O. GILLARD, Vegetable Instructor, Department of Agriculture, Auckland

SWEET corn (*Zea mays v. saccharata*), a native of America, is believed to be a sport of field corn and was grown in New England early in the 19th century. At that time white-kernel varieties mainly were preferred, and it was not until the beginning of the present century that a few yellow varieties were known. These were looked on as poultry food. Then in 1902 W. Atlee Burpee named and introduced Golden Bantam. This variety gained popularity and helped to break down prejudice against yellow sweet corn, and in consequence the demand for yellow varieties increased. Today the consumer, and especially the canning factories, favour the golden-kernel varieties, although there are many excellent white varieties and hybrids.

THE differences between sweet corn and other corns are the high sugar content of the former when in the partly mature or early dough stage and its wrinkled, translucent kernels when dry. The only genetic difference between the composition of a sweet corn kernel and that of a field corn kernel is a single recessive factor out of the hundreds present in the corn. This recessive factor makes the sugary condition of the kernel persist in sweet corn, preventing the sugar from turning into starch.

Because sweet corn for human consumption is harvested before the kernels begin to harden, it can be produced in localities where the season is too short to mature field corn for grain.

Of recent years sweet corn production in the Auckland Province has been increasing rapidly. Approximately 27 acres of sweet corn are grown annually for markets and some 1300 acres are planted under contract for canning, about 1000 acres of this area being in the Gisborne district. In addition sweet corn is grown in most home gardens.

An average yield from an acre of sweet corn is about 8000 cobs, or 3 to 4 tons (including husk). About 600 to 900lb. of canned corn is obtained from 1 ton of sweet corn cobs.

Varieties

Because of cross-pollination, most varieties of corn are so mixed that they can be changed readily by selection under a new environment, and there are countless strains within most of the important varieties. In fact it is sometimes possible to find greater differences in strains within a variety than between varieties having the same seasonal requirements. It is unwise to save seed from plants grown in the vicinity of other varieties, because free cross-pollination results in mixed progeny of varying quality. The most popular variety grown in New Zealand is Golden Cross Bantam, which is a hybrid.

Hybrids

The larger proportion of sweet corn plants grown today consists of hybrids. Hybrid sweet corn is usually grown from seed resulting from a cross between two distinct inbred lines.

First generation hybrids are generally superior to parents in vigour, yield, and disease resistance, and are fairly uniform in size, maturity, and quality.

Hybrids are therefore valuable for the first generation only and new seed supplies should be procured from the breeder or his agents each year.

Uniformity in time of maturity in hybrids is a great advantage to the grower who is supplying a cannery, but of less importance to the home gardener or market gardener, who may prefer a longer period of harvest.

Climate and Soil

In domestic and commercial gardens sweet corn forms an ideal shelter border for tender vegetables and is not without decorative effect.

Corn is a heat-loving plant; the hotter the summer temperature is, and the more sunlight it receives, the greater are its chances of success. It is frost tender and can be grown successfully only where no frosts are experienced during the growing period. However, once the usable stage is reached cool temperatures are desirable, as they retard the change of sugars into starch in the kernels, whereas high temperatures hasten it; for this reason ears that mature under cool conditions are of best quality.

Provided that the soil is rich and clean, good crops can be produced on soils ranging from sands to clay, though the intermediate types are more consistently satisfactory. A warm soil with some sand in it is more desirable for early growing. Sweet corn produces well on well-drained and sweetened swamp soils or river flats.

Preparation of Seed-beds

In preparing land for sweet corn the grower should aim at providing the best possible conditions of tilth by the

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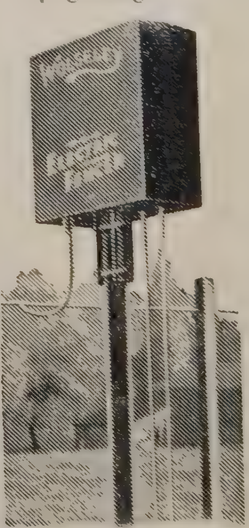
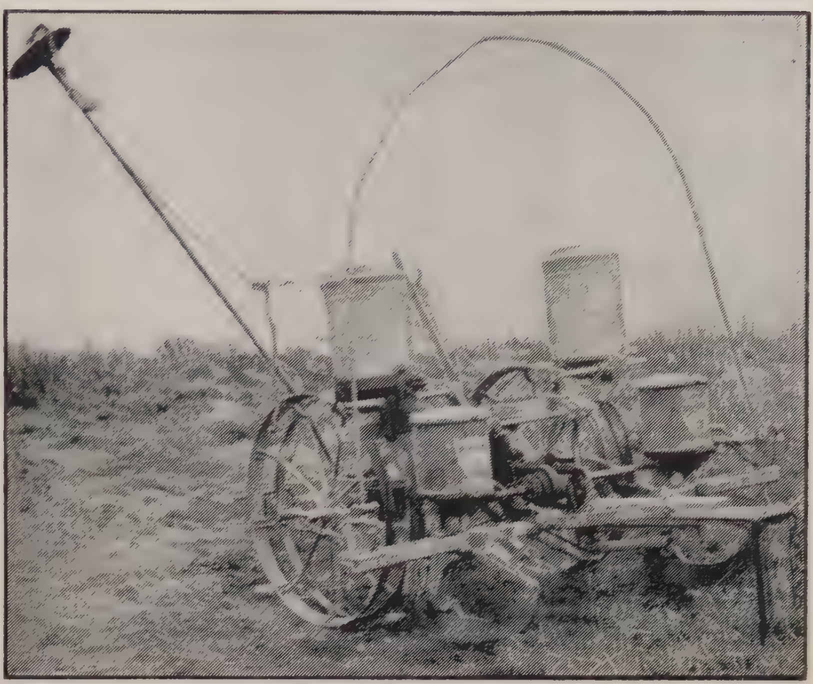


time the seed is to be sown. If land selected is to be taken from grass, it should be ploughed before winter so that exposure to winter rains and frosts will assist in breaking down the turf, pulverising the soil, and destroying harmful pests that may be harboured in the soil. Skim ploughing is satisfactory as the initial ploughing, but it should be followed in early spring with a deep ploughing to 8 to 10in. according to the depth of the soil. Further cultivation should consist of thorough discing, harrowing, and rolling to produce a fine and firm seed-bed at least 2 weeks before the sowing of seed.

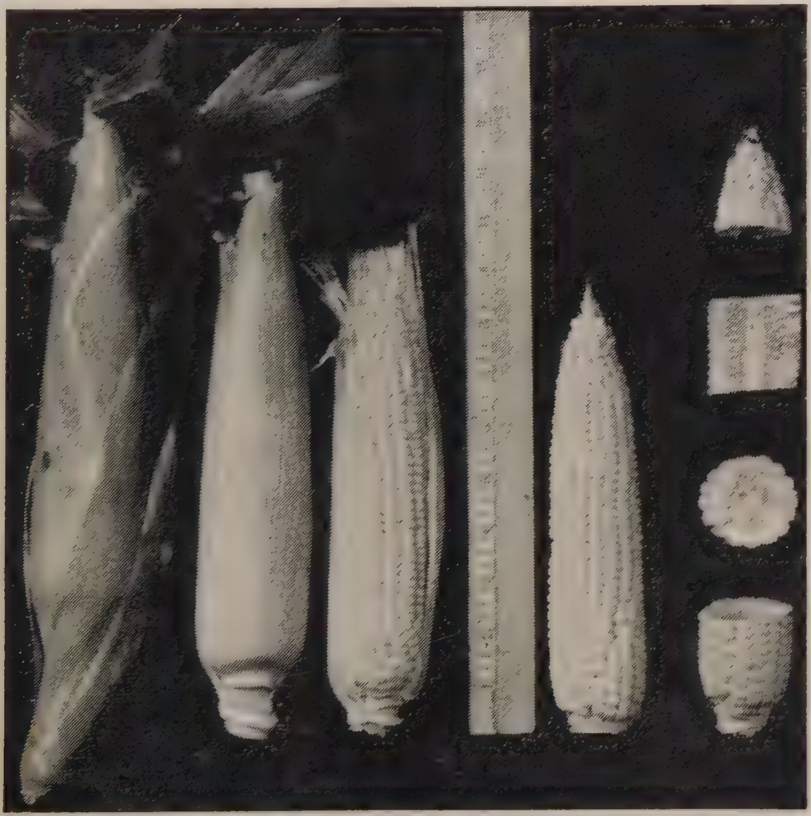
Well-worked soil and checking of weed growth before sowing of the seed are desirable. No amount of cultivation after the crop is sown can make up for deficiencies in the preparatory work.

Sweet corn requires an abundance of plant food and moisture, and responds best on soils with a high humus content.

The moisture-holding capacity and humus content of the soil can be improved by applications of organic matter (animal manure, compost, or green crops). If animal manures or compost are not available, blue lupin crops are perhaps the best means of building up the humus content of the soil. When in full flower the lupins should be disced or rotary hoed in.



Two-row planter for sweet corn.



[*Sparrow Industrial Pictures Ltd. photo.*

Sweet corn Golden Bantam Improved. From left to right—Cob before trimming. Trimmed cob. Cob partly stripped. Cob fully stripped, showing well-developed kernels. Same cob dissected to show size and shape of kernels.

Lime

Sweet corn, like most vegetable crops, does best on slightly acid soils (pH 6.5 to 6.9). Extremely acid soils should be avoided; moderately acid soils should be limed at the rate of ½ to 1 ton per acre, depending upon the degree of acidity.

The form of lime applied must be determined by conditions. If quick results are desired, burnt shell or hydrated lime may be advisable, but under most conditions carbonate of lime (ground limestone) is satisfactory.

Manuring

Most large areas of sweet corn are sown with a corn-planter or a grain drill adapted to sow two or three rows at a time. By either method fertiliser may be sown with the seed, but the capacity for sowing the fertiliser is limited to about 3cwt. per acre, and as there is a danger of artificial fertiliser affecting germination or damaging root growth if it is sown with the seed, the safest practice is to sow the manure broadcast over the area and to work it lightly into the soil several days in advance of the seeding date.

An application of 3cwt. of fertiliser per acre is sufficient where the soil fertility is high, but for poorer soils as much as 10cwt. per acre of a fertiliser mixture is desirable. Where large amounts are required it may be best to apply part of the fertiliser broadcast and the remainder may be supplied as a side dressing, away from the rows of plants, at the time of the second cultivation. Good results have been obtained by applying phosphate and potash while the soil is being prepared for seeding, and then applying nitrogen as a side dressing when the

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[*A. Low photo.*

Harvesting sweet corn for canning by machine.

plants are about 12in. high. Though this practice is desirable for obtaining the best growth and highest yields under some soil conditions, it involves the extra labour of going over the field to apply the materials separately.

A good general fertiliser mixture consists of 4 parts of superphosphate, 4 parts of blood and bone, and 1 part of sulphate of potash.

Sowing

The time of sowing is governed by the weather; if there is a likelihood of frost occurring, the corn should not be sown, as it will not withstand even light frosts. With the exception of a few early localities, where it is possible to sow late in September to take advantage of the early market, mid-October is regarded for Auckland conditions as the best period for the first sowing. In the Gisborne district where the crop is produced for canning November is considered as the best month for the first sowing. For market gardeners and the home gardeners in the Auckland district successive sowings at 3-week intervals until mid-December will give a continuous supply of cobs from January until June.

Rate of Sowing

The rate of seeding varies somewhat according to the size of the seed, the purpose, and the method of planting, but from 8 to 10lb. usually is required to plant 1 acre.

Method of Sowing

Usually seed is drilled 1½ to 2in. deep in rows 28 to 35in. apart, with the grain spaced at 9 to 12in. apart in the rows. The wider spacings are preferred, as they allow for better development of the plants and result in larger cobs. For such sowing a special 2-row corn seeder, which sows seed and fertiliser, or an ordinary grain drill suitably adapted may be used. With the latter, three rows may be sown at a time. When a grain drill is used some of the coulters should be removed to allow spacings of 28in.

Where small areas are to be sown, lines may be drawn out across the field and the seed dibbled in at the required spacings and depth. Early sowings are not covered as deeply as later ones; the seed is covered more deeply in sandy than in heavy soils.

Cultivating the Growing Crop

Where sweet corn follows grass the problem of weed control is not as great as when it is grown in annual succession with other vegetable crops, when weeds often become prolific.

It is a good practice usually to cultivate the crop frequently whether weeds are showing or not.

Cultivation should begin as soon as the plants are a few inches high. At this stage tine harrows may be drawn across the field at right angles to the rows. Provided the day is a warm, sunny one when this is done, very little damage will be caused to the plants, while the check to the seedling weeds will reduce greatly the amount of hoeing between the plants in the rows later.

When the crop is 9in. high inter-cultivation with horse- or tractor-drawn scarifiers can be carried out to control weed growth and to aerate the soil. Sweet corn roots grow straight down for a few inches below the plants and then run almost horizontally under the surface between the rows. For this reason the first inter-cultivation may be fairly deep, but as the plants grow cultivation should be shallower to avoid cutting off feeder roots.

When plants have reached the stage when young cobs are forming the final cultivation is given. Where mechanical pickers are not being used in the harvesting, moulding the earth up to the plants (as for potatoes) may be done with a moulding machine, care being taken not to injure the roots by going too deeply.

The implements most commonly used for inter-row cultivation of sweet corn are the adjustable single-row one-horse scarifier, or a small walking tractor with cultivator attachments, which can be used until the crop is well forward. On larger areas tractor-drawn 3-row scarifiers are used until the crop is about half grown, after which only single-row implements can be used. Usually about six cultivations are necessary before moulding up the plants.

Removal of Suckers

The practice of removing the sucker shoots, which grow from the base of the plant, is becoming more general, although it is not economic on large areas. It is claimed by growers that when suckers are removed plants produce larger and better cobs, compared with a larger number of smaller cobs if the sucker shoots are left to develop. Suckers should be dealt with when young. If they are removed after reaching 1ft. or more in height, the main plant often is disturbed.

Harvesting

As high quality in sweet corn is obtainable only over a short period during the development of any variety, close attention must be given to harvesting the cobs. Early varieties

[*Sparrow Industrial Pictures Ltd. photos.*

Left—In harvesting on small areas each picker works between two rows of corn at a time, selecting each cob for maturity, wrenching it from the plant with a downward movement, and placing it in a sack. Sacks when filled are carried to the headlands for transport to the packing shed. Right—Sweet corn for the markets is trimmed (blade shears are excellent for this work) and neatly packed in containers.

pass through the best edible stage more rapidly than later varieties. Cobs to be of finest quality should be harvested in the milk stage, when they are juicy yet plump and firm and the silks are fairly dry. The top should be filled out so that the husk is tight and the tip is blunt. In the nail test which is sometimes used as a guide to suitable maturity the thumb nail is thrust into the kernel. If the exudate is milky, the corn is said to be in the milk stage. If dough is forced out, the corn is too ripe to be of best quality. Experienced growers can usually determine the right stage of maturity by the appearance of the cobs and by feeling the ridges of corn through the husk with the tips of the fingers. They also note the condition of the silks (almost dried off) and the plumpness of the cobs.

Frequency of Picking

For fresh corn for marketing and household use frequent picking is advisable, as all cobs do not mature at the same time. For canning the usual practice in the Gisborne district is to harvest a field in one operation; hence uniformity in maturity is an advantage.

In harvesting on small areas the cobs are broken from the stalks of the plants by a downward pressure of the hand; they are then placed in harvesting bags, which when full are dispatched to the packing shed, where cobs are trimmed. The stem ends are cut back to within 1in. of the seed, half the wrapper leaves are removed, and any leaf growth with the silks is cut off. On the large areas of sweet corn grown for canning at Gisborne a mechanical picker is used and the machine picks the cobs with husks attached and delivers them to a truck running alongside. For the markets cobs are usually packed into No. 8 cases (4½in. x 12in. x 16in.), which hold 2 dozen first-grade or 3 dozen second-grade or smaller cobs.

Nearly 60 per cent. of the sugar changes to starch within 36 hours of harvesting, and the change is more rapid if conditions are warm. It is advisable to pull sweet corn early in the morning, when the cobs are cool and to take it immediately to the markets. For canning corn should be harvested and sent to the factory for processing the same day. High temperatures due to weather or to cobs being left in heaps or in trucks for several hours cause a loss of flavour in sweet corn, even if sugar is added when the corn is canned.

Diseases and Insect Pests

Smut in sweet corn can cause serious loss. It can be reduced, but not controlled, by dusting the seed with a suitable organic mercury dust. Smut should be prevented by seed dusting and the use of new ground or at least ground which has not been sown to maize or sweet corn for 3 years.

Troublesome insect pests include the following:—

Cutworms: This term is applied to the caterpillars of a number of night-flying moths. These caterpillars are from 1 to 2in. long when full grown. They feed at night, a characteristic of their method being that they nip off young plants close to the ground. During the day the cutworms are to be found curled up in the ground close to the plants they have been attacking.

Cutworms are reduced in numbers by careful preparation of the land and regular inter-cultivation. If cultivation is delayed, allowing weed growth to flourish in the growing crop, ideal conditions are provided for the pest to increase. Where cutworms are troublesome the land should be ploughed early, winter fallowed, and worked well to allow birds to gather grubs and to keep down weed growth.

Army worms: These caterpillars are similar in appearance and general habits to cutworms, but differ in their method of attack. When present in numbers they move through a crop, especially cereals, eating as they go and leaving nothing.

To control the caterpillars plants should be sprayed with 50 per cent. D.D.T. wettable powder, 1lb. in 100 gallons of water (½oz. to 4 gallons).

Corn earworm, or tomato caterpillar, sometimes causes damage to cobs. The moth of this caterpillar usually lays its eggs in the tassel or tip of the "ear" of the cob, and when the young grub emerges it eats its way into the cob, devouring part of the covering, and then feeds on the kernel.

The control is the same as for the army worm or cobs may be dusted with a 2 per cent. D.D.T. dusting powder, the operator directing the dust mainly to the tops of the cobs.

Green vegetable bug: This bug feeds on all parts of growing sweet corn, but the principal damage is caused by the sucking of the "milk" from the immature seeds, which soon collapse and turn dark. To control this pest plants should be sprayed as soon as the bug is seen with 50 per cent. D.D.T. wettable powder, 1lb. in 100 gallons of water, or with a hexaethyl tetraphosphate preparation.

Responses to Basic Slag in South Auckland

By J. E. BELL, Fields Superintendent,
Department of Agriculture, Auckland

BASIC slag has had generally a very high reputation among pastoralists of Auckland and Taranaki Provinces because it had a magical effect almost everywhere on pasture production. Early in the present century not much lime was available or was used and superphosphate was therefore not as effective on the heavier and more acid soils of the Auckland Province, although it bore the magical touch elsewhere and when liming became more general superphosphate was as universally effective as slag.

THE many observational trials that have been laid down in Auckland Province have borne out the value of basic slag, which because of its effectiveness on almost any soil and its cheapness in the past was deservedly popular. The place of basic slag in the Northland peninsula was recorded by E. H. Arnold in the February 1951 issue of the "Journal". The following survey discusses its value in the remainder of the Auckland Province and south of Auckland City. The soils of this region are generally much less acid than those in Northland and consequently the results do not show basic slag in such a favourable light.

Observational Trials

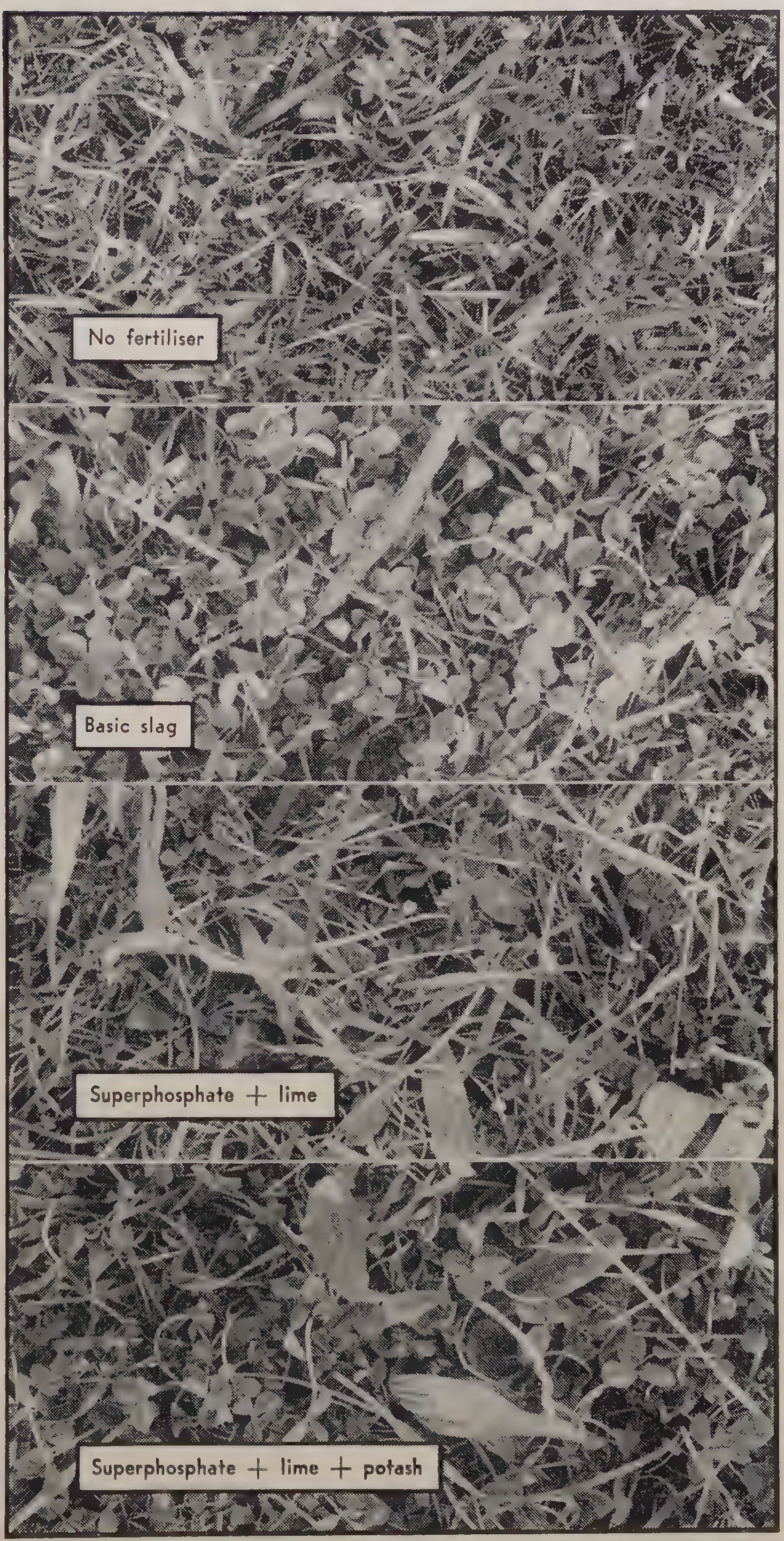
Results are based on about 200 observational trials carried out in the last 20 years. Painstaking and specialised work by Instructors in Agriculture was involved in carrying out these trials. Frequent observations had to be made so that the effects of the treatments at different times of the year could be gauged.

Usually the treatments (per acre) in the trials were as follows:—

1. Superphosphate, 3cwt. per annum.
2. Superphosphate, 3cwt. per annum + lime, 1 ton followed by annual dressings at 5cwt.
3. Slag, 3cwt. per annum.
4. Slag, 3cwt. per annum + lime, 1 ton followed by annual dressings at 5cwt.

Siting of Trials

The trials were treated and frequently observed for about 4 or 5 years and were placed on the main soil types, particularly those more regularly topdressed. Few trials were therefore placed on the steep greywacke hills, but some were laid down on soils derived from limestone, mudstone, and sandstone that generally flank the steep greywacke hills and mountains. These soils are usually heavy and grey and very lime deficient, and on them responses from basic slag were superior to those from superphosphate. Generally superphosphate and lime gave better results than slag, but on one or two trials the reverse was true. In places these soils have been covered with andesitic volcanic material, giving rise usually to loams which are generally brown. On some of the hills these



The photographs at right show responses obtained on pastures in Franklin County.

soils have been washed off, mainly from the steep sides and ridges, and have been deposited in valleys or on plains.

On the heavier andesitic volcanic clay loams such as the Hamilton clay loam slag showed responses superior to those of superphosphate, the degree of superiority being dependent on the maturity of the soil—the greater the maturity the greater the superiority of basic slag. On immature soils there was very little difference, but where the soil has become so mature that it has lost its brown colour and is grey and very heavy in texture, slag may be superior even to superphosphate and lime.

On the andesitic Mairoa loams, which are usually lighter in texture than the Hamilton clay loam, superphosphate proved superior to basic slag. These soils are extensive in the King Country and extend through Te Awamutu to Ohaupo, where they form deep deposits, and through Raglan County in small and large pockets. It is the Mairoa material mainly that has been washed off the hills and the same results have been noted on the water-sorted volcanic material in the valleys among the hills on the extensive Karaka plains south of the Manukau Harbour.

Pumice Soils

Most of the volcanic soils of the Central Plateau and the Bay of Plenty have been derived from pumice. Pumice material has also been brought down by rivers to form much of the low-lying country of the Waikato. On the primary podzolic soils of the Taupo and Kaharoa families, which occupy most of the Central Plateau and extend to the Bay of Plenty, a well-defined superiority of superphosphate to slag was shown. These soils do not display a need for lime. Other pumice soils in the yellow-brown loam grouping, including the Waihi and Whangamata families, showed the same trend, but on others, including the Whakatane and Horotiu families, superphosphate and slag gave similar results.

The basaltic soils in Franklin County, however, showed slag to have, if anything, a very slight superiority to superphosphate.

Alluvial and Meadow Soils

Not many trials were laid down on alluvial and meadow soils, but on these slag gave equal responses to superphosphate. Insufficient trials have been laid down to compare these fertilisers on peat. However, one trial recently laid down on dry peat shows distinctly the superiority of superphosphate. The position may be reversed on peats receiving an adequate supply of moisture, but where liming is adequate there should be little difference.

Responses on soils can be gauged to a fair degree on their physical characteristics, the heavier soils being more responsive to slag and the lighter soils to superphosphate. Though there is this general relationship between soils and differences in responses to superphosphate and slag, the cause is mainly due to leaching and loss of soil bases. The more mature acid soils are most likely to give good results from slag. The table below shows this trend quite clearly. The lime requirement has been determined by the visible response to lime in the trials, which, next to more exact techniques, such as mowing weights, is probably the surest and most delicate guide.

RELATION OF SLAG TO SUPERPHOSPHATE WITH REGARD TO LIME REQUIREMENT

	Number of trials		
Lime response	Slag worse than superphosphate	Slag equal to superphosphate	Slag better than superphosphate
Nil ..	23 (61%)	12 (31%)	3 (8%)
Slight .	11 (34%)	13 (41%)	8 (25%)
Fair ..	5 (17%)	13 (45%)	11 (38%)
Great .	0	3 (50%)	3 (50%)

A great lime response really means that the soil probably needs 2 or 3 tons of lime per acre at first, but good progress can be made with an application of 1 ton per acre if this is followed up with annual applications of lime at 5cwt. per acre. A slight response will be quite payable.

Farmers contemplating using basic slag should give consideration to the present high price of this fertiliser. Its use should be considered only on the very few soils where it is superior to superphosphate and lime and on those soils which require fair amounts of lime and where this cannot be applied. Unfortunately slag cannot yet be applied efficiently by air, a method which would be of value for getting slag on to the lime-deficient hill country usually called "hard country" by the hill-country farmer. It can, however, be applied by blower topdresser and consideration can be given to this cheaper though less efficient method.

Farm Drainage Bulletin

The equipping of a farm with an efficient and adequate drainage system requires considerable expenditure of time, energy, and money, and before undertaking this very necessary work farmers require expert advice on all aspects of farm drainage.

The Department of Agriculture has recently issued a completely revised edition of Bulletin No. 286, "Farm Drainage". The publication advises on basic drainage principles, various types and depths of drains for different conditions, and planning and construction of systems, and gives details of drain capacities and grades in relation to various soil types.

The bulletin is available free at any office of the Department of Agriculture.

Protecting Water Troughs

A SURROUND consisting of a strip of concrete 2ft. wide, 4in. thick, and slightly above ground level prevents excessive muddying round water troughs on the farm of Mr. F. A. L. Whiting at Lowgarth, Taranaki. It also protects troughs from damage through the undermining that frequently occurs through trampling by stock round the bases of troughs.

Concrete provides a much more lasting and efficient solution to the mud problem in gateways, yards, and around water troughs in wet weather than does road metal, which has to be renewed as successive dressings are trampled into the soil.

—J. M. LOCKHART, Instructor in Agriculture,
Department of Agriculture, Stratford

REGISTRATION OF
DAIRY FACTORY MANAGERS

Intending applicants are hereby notified that applications for registration under the Dairy Factory Managers' Regulations should reach the Registrar, Dairy Factory Managers' Registration Board, c/o Department of Agriculture, P.O. Box 2298, Wellington, on or before 1 December 1952. Forms are available from the Registrar.

Attention is drawn to the fact that any application which is received by the Board after 1 December 1952, shall not, except in special circumstances, be considered by the Board until after 1 December 1953.

E. M. EDGECOMBE,
Registrar.

N.B.—*This notice refers to persons who are NOT AT PRESENT HOLDERS OF CERTIFICATES. Notice of renewal and renewal form will be posted to every registered manager by the Registrar.*

Importance of Good Bee Combs

MODERN beekeeping is based on the use of movable bee combs and a reserve stock of correctly drawn combs is, apart from his bees, a beekeeper's most valuable asset. The comparative value of good and inferior combs, which is not always recognised by beekeepers, is discussed in this article by E. Smellie, Apiary Instructor, Department of Agriculture, Auckland.

THE invention of comb foundations made practical the keeping of bees on a commercial scale which previously could not be attempted. With its use beekeepers can induce bees to build comb into movable frames which are perfectly straight and evenly drawn with worker cells. The use of comb foundation does not, however, always ensure the production of the desired type of combs. If the greatest number of correctly drawn combs are to be secured by the beekeeper from the comb foundation used, an understanding of the features of natural comb building is essential.

In a natural or wild bee colony the comb mass is roughly spherical and follows a fairly constant pattern. The several combs are firmly attached to the roof and sides of the dwelling and are built downward with a uniform bee space between them. This space is approximately ⅜in. and is fairly evenly maintained, as the adjacent combs to those which may be bent or convex have a corresponding bend or concavity. When combs are built which deviate from this parallel aspect the spaces created by such a divergence are utilised with the construction of a smaller comb of a size which retains the usual bee space between each comb surface.

A very important feature in natural comb building is that the bees build combs according to the needs of the present rather than to a plan which will best ensure the future welfare of the colony. Observation has shown that when comb building first begins worker cells are built for as long as the queen can continue to lay eggs in them promptly. As soon as nectar is being gathered in quantity, however, the queen is then unable to lay eggs in these new cells owing to the prior storage of honey. At this stage the queen is crowded away from the worker cell building area and the bees then build the larger drone cells and later the honey storage cells. When comb building has been completed usually about one-fourth of the total area of comb surfaces is occupied by both drone and honey storage cells. Honey storage cells are also suitable for the rearing of drones and in future years the bees will utilise them for this purpose. Because of this, wild hives which have been established for some time are prodigal in the rearing of drones.

Any or all of the undesirable features associated with natural combs can be present in modern beehives, but where the best beekeeping practices are co-ordinated with the instincts of the bees good combs can be obtained which will be of use over many years.

The primary purpose in keeping bees is to secure the greatest amount of honey that is possible in each season. It naturally follows that the more worker bees there are in a hive during a honey flow the greater will be the quantity of surplus honey gathered. Therefore, if a colony is to produce this maximum, a beekeeper's first consideration is to ensure that the population of worker bees in each hive is developed to the fullest extent at the beginning of the main honey flow. This objective can be facilitated when the hives are adequately equipped with combs that are straight and comprise 95 to 100 per cent. of worker cells.

Combs which are crooked or damaged or contain too much drone comb are unsuitable. These not only impede the rapid expansion of the brood nest, but also reduce the bees' capacity for brood rearing. For the beekeeper drone bees are a liability, and a severe drain on the hive's resources, but the bees will use every opportunity to rear them. The rearing of a single larva requires the feeding of a full cell of honey. The average drone also eats the equivalent of another full cell of honey before he dies, and on this reckoning a single frame containing all drone brood consumes the equivalent of two other full frames of honey. This represents not less than 10lb. of honey which for practical purposes is worse than wasted. For every additional area of drone comb this wastage or loss of honey from the colony will be increased proportionally. Another aspect for concern is that an excessive drone population will promote prematurely the impulse which induces bees to swarm. Once a colony has swarmed, particularly before the honey flow, its value as a honey producer is reduced.

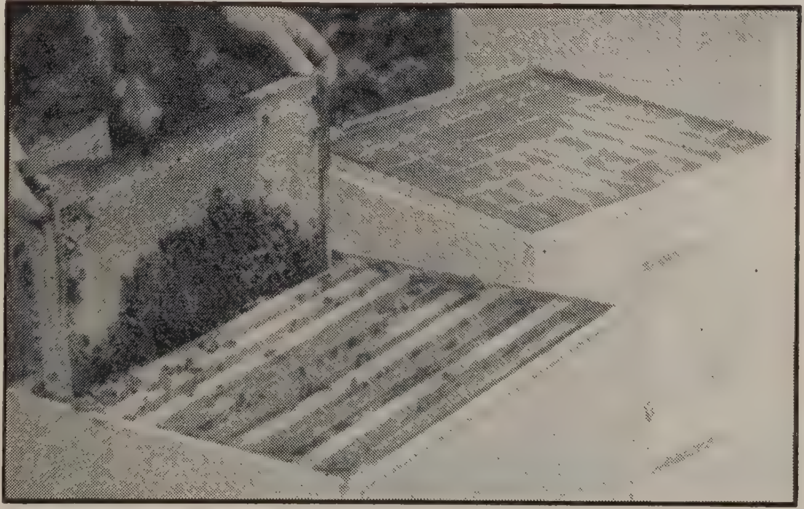
Misshapen and uneven combs also give the beekeeper much unnecessary difficulty in manipulating his hives, as it is seldom that the position of such combs can be interchanged within the brood nest. When this interchange cannot be avoided many bees are crushed into the sides of the combs and great numbers of them are injured or killed. This process excites and infuriates the bees and the beekeeper has to suffer a painful stinging.

The perfect comb is one that is straight and comprises all worker cells utilising all the space within the frame and is securely attached to both of the end bars and the bottom bar.

Drawn combs of this type will give many years of useful service and if they are to fulfil this requirement, proper attention must first be given to the initial frame assembly, which only the beekeeper can assure.

To ensure that the combs hang straight and parallel and that the top and bottom bars do not pull away during hive manipulations the four corners of the frame must be securely nailed and form right angles.

Wiring the frames and embedding the foundation comb are relatively simple, but it is the way this phase of the work is handled which is often responsible for the bees building inferior combs. Frames should always be wired with good-quality tinned wire of not less than 28 to 29 gauge, which is neither too hard when twisted nor so soft that it breaks when being pulled to the required tension. Galvanised and plain wire are unsuitable as they soon rust. When these wires break drawn combs have insufficient support and may collapse when handled in the apiary or in the honey extractor. To be effective each of the three horizontal wires in a frame should have a twanging tautness. This degree of tension cannot



Correct spacing of frames is essential to secure well-drawn combs.

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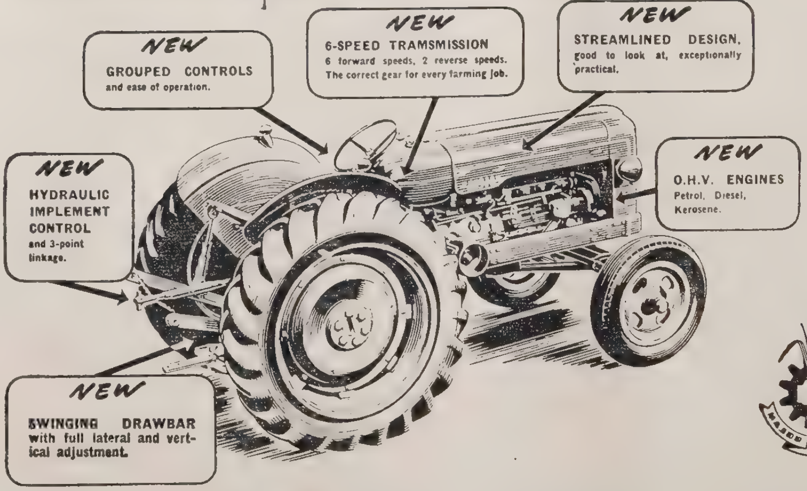
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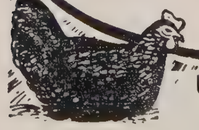

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be maintained unless the foundation comb is embedded as soon as the frames are wired and thus wiring and embedding work should be co-ordinated.

With slack wiring the foundation comb usually becomes distorted and stretched after being placed in the hives. Foundation comb stretched in this way is then more likely to be drawn out by the bees into drone cells. In some instances as much as half the total comb area may be drawn out with drone cells and rendered useless for brood rearing.

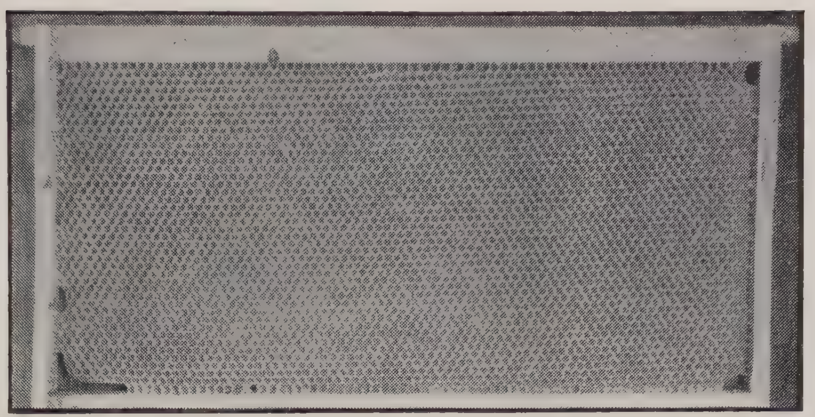
When the foundation comb sags out of the groove in the top bar of the frame and bends over toward the adjoining comb, owing to the weight of the bees, cross combs are invariably built which cause much inconvenience to the beekeeper and damage to the comb and those adjoining it. For the same reason even when the wires are tight, care should be taken to ensure that the foundation is pushed right up into the groove of the top bar before the wire is embedded. Where the wires have not been completely embedded bees are inclined to gnaw holes in the foundation comb at the points where the wires remain exposed. Holes made in this way are usually filled in later with drone cells, or left open, when the usefulness of the comb is impaired according to their area.

Wiring and fixing of foundation comb into frames should be left until as shortly before use as is practicable. Foundation is very brittle in cold weather and cannot be handled without much breakage or loss. More important, it loses condition and becomes very stale when it is in the frames too long before being drawn by the bees. The bees are also reluctant to accept stale foundation and it should not be placed on the hives until there is a flow of honey being gathered; otherwise the bees will gnaw holes in it with the result already indicated.

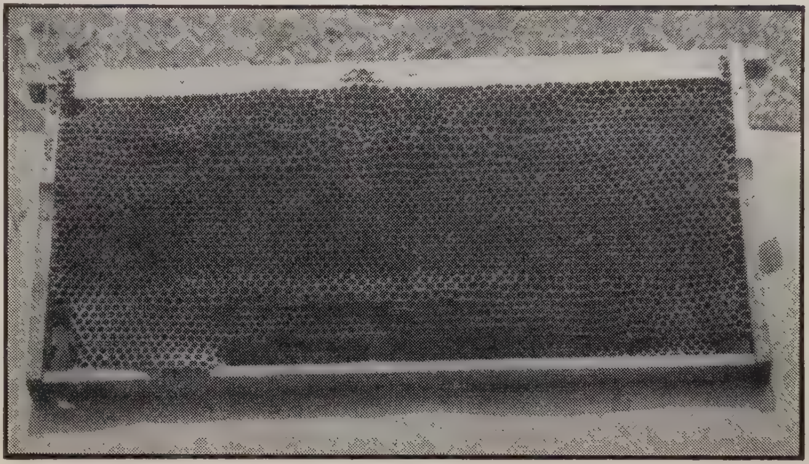
Good-quality foundation (not more than eight sheets to the pound) should be used. It is false economy to try to save expense by using foundation which is too thin, as it is not only incapable of standing up to the strain, but makes it more difficult to get good straight combs. To fit frames with only starters or narrow strips of foundation is not good practice, as the pattern of the combs built will be irregular as in a box or wild hive. The production of an adequate stock of superior worker combs by this method is both very costly and difficult.

Comb foundation is one of the most essential items of equipment and where it has to be purchased is one of the most costly. Any economy in its utilisation, however, is very unsound, as the cost of foundation is saved many times over in ease of handling and increase in honey gathered. In a well-managed apiary there is an annual production of beeswax in excess of that necessary for conversion into foundation comb and the use of heavy, full sheets of foundation is therefore not an extravagance but a sound investment.

Bees produce wax most economically in quantity when there is active breeding, a good nectar flow, and warm atmospheric temperatures. Under these conditions bees are able to secrete wax in quantity for comb building with the consumption of not

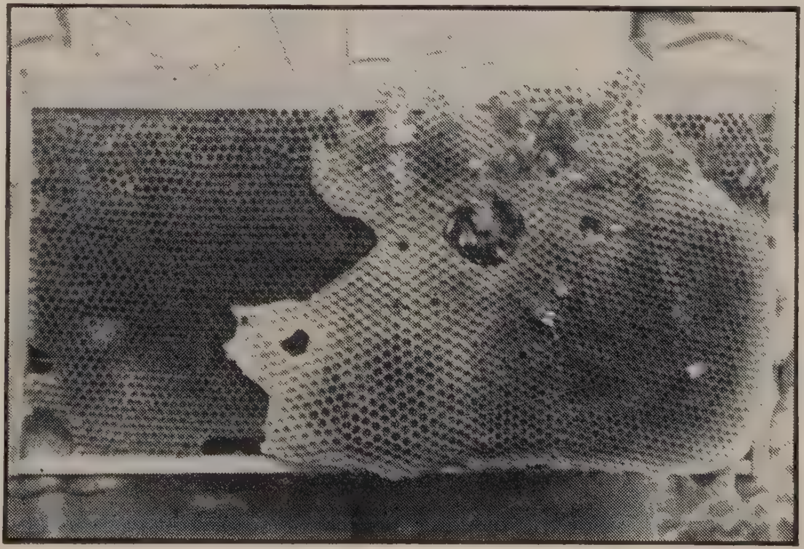


A good comb for all purposes in a honey-producing hive.



[Green and Hahn Photography Ltd. photo.

Faulty wiring and sagging of the foundations induce the bees to build much undesirable drone comb.



Piece of undesirable comb built by the bees between frames unevenly spaced in the hive by the beekeeper.

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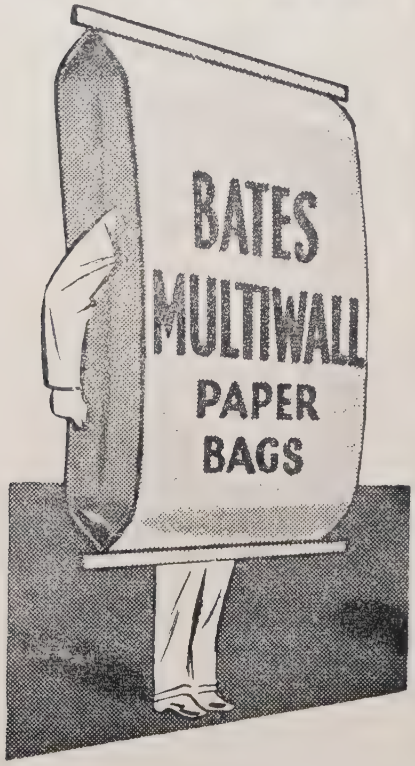

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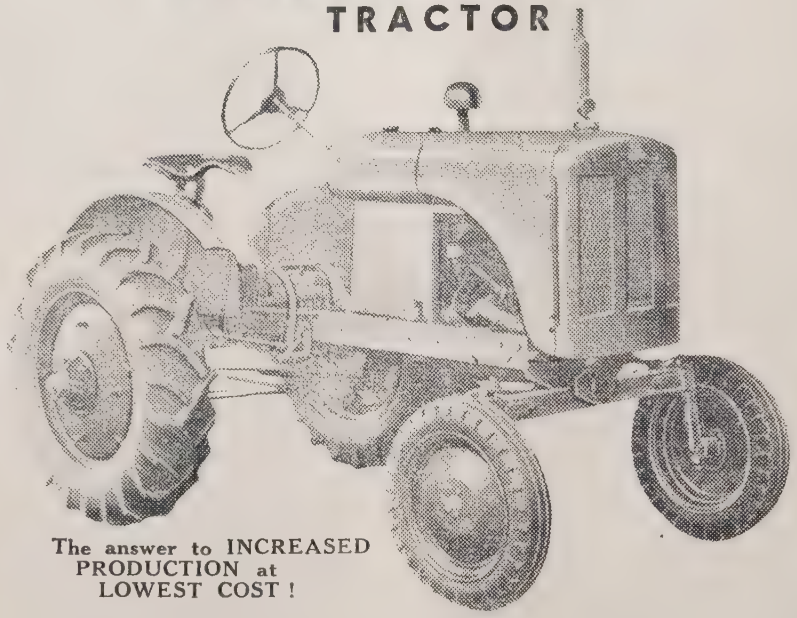

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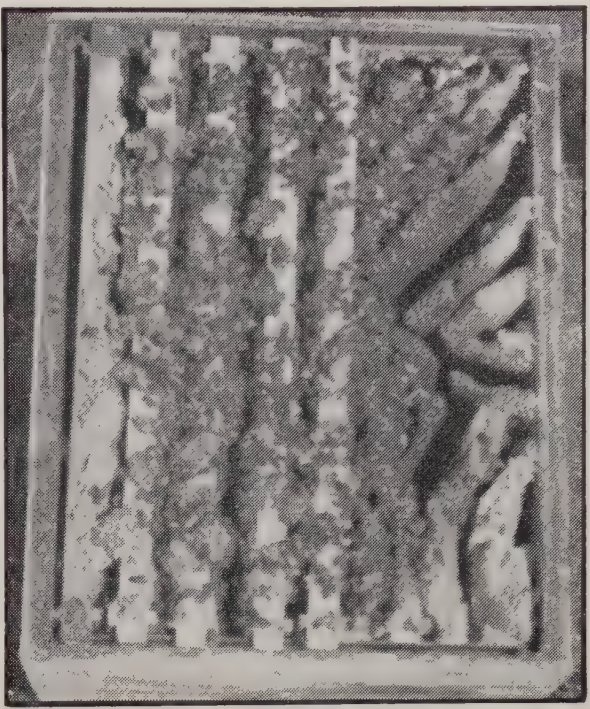
less than 6lb. of honey for each pound of wax. On the other hand, to produce wax in cool or cold weather the bees have to force up the temperature inside the hive by the extra consumption of both honey and pollen and may use up to 20lb. or more of honey in producing a pound of wax. When these conditions pertain and comb building is absolutely necessary it is wise to indulge the colonies by feeding extra syrup or honey; otherwise the bees may tear down unoccupied foundation.

The cost of drawn combs cannot be estimated solely by the cost of foundation or the amount of honey consumed by the bees in comb building. There is also the loss of time by the bees in digesting the honey, as well as the time required in building the comb. More important, if the honey flow is on, the bees may not be able to take full advantage of it for lack of sufficient storage space. It follows that when possible foundation should be put on the hive when a flow is expected and brood rearing is progressing without interruption.

When foundation combs are being drawn by the bees the frames should be spaced not further apart than 1⅜in. from centre to centre. With Hoffman self-spacing frames this spacing is achieved automatically provided 10 frames are placed in each super. This spacing is important, as in nature it appears that 1⅜in. is the average for worker cell comb and 1½in. for drone comb. Where 1½in. spacing is provided the bees are then encouraged to build more drone comb than they would if the spacing was 1⅜in. Moreover, if the spacing is excessive, the bees will build additional brace combs between the frames of foundation.

It is a good practice once the 10 combs have been drawn to remove one of them and use only 9 combs in each super. This is not only an economy in the number of combs required for each hive, but facilitates brood manipulations. In honey storage supers it also results in the bees making thicker combs, which hold more honey and are very much easier to uncap for extraction.



Empty space in the hive, in which the bees have built useless cross combs.

When possible foundation comb should be placed in supers above the brood nest, as the bees are then more likely to build each comb fully from one end bar to the other and from top to bottom bar. On the other hand, if foundation frames are placed in the brood nest, the bees are liable to finish the combs short of the side and bottom bars. Such combs have very little strength and invariably break when placed in the honey extractors.

Imperfect combs are not unusual, even though they may have been properly reinforced and drawn under favourable conditions. Each year 5 to 10 per cent. of the newly drawn combs can be culled and profitably replaced. In many of the older-established hives where culling is not seriously practised as many as 50 per cent. of the combs could be culled to advantage. Apart from the drone combs such hives may also contain some damaged, pollen-clogged, and otherwise irregular combs.

Some beekeepers are reluctant to dispose of their poorer combs after their removal from the brood nest and instead use them in the honey storage supers. This is a very short-sighted policy, as such combs eventually get back into the brood nest in spite of the beekeeper's best intentions. Combs which can rightly be regarded as culls should be rendered into beeswax. With this policy there is no loss to the beekeeper, as each comb is capable of yielding about twice the quantity of beeswax required for a sheet of comb foundation.

Consistent culling from year to year will subsequently reduce the number of poor combs which have to be culled annually. This practice contributes in large measure to a beekeeper's success, as it results in an over-all increase in both storage space and worker bees which gather the crop.

In the off-season, when supers of combs have to be stored, special precautions must be taken to protect them from the ravages of both mice and wax moth infestation. In southern districts where winter temperatures are too low for the large wax moth (*Galleria mellonella*) to be a serious problem mice probably do most damage to drawn combs. Mice which gain entrance to the hives or to stored combs destroy the combs by eating large holes in them to provide space in which to build their nests. Entrance blocks fitted to hives giving an opening of not more than ⅜in. in height and a width of 2in. will prevent the entry of mice.

The wax moth in warmer districts is not likely to damage combs within the hives during winter if the colony is strong and has sufficient bee population to cover the combs, especially where the Italian strain of bee is used. Full particulars of methods for controlling the wax moth on stored combs may be obtained from the local Apiary Instructor of the Department of Agriculture.

Because a large stock of good combs is difficult to obtain and is also of great value to the beekeeper, special care which is necessary for their protection and maintenance should not be neglected.

Firearms Must be Loaded Carefully

MANY serious shooting accidents have occurred through firearms being loaded without the users' first making sure that the weapons were not pointing near other people. If the gun being loaded in the illustration at left were to fire accidentally when the breech was closed, the man in front would certainly be hit.

When a firearm is being loaded it should either be pointed toward the ground or, preferably, the user should turn completely away from anyone near him so that any risk of an accident is eliminated.

—*G. G. KELLY*

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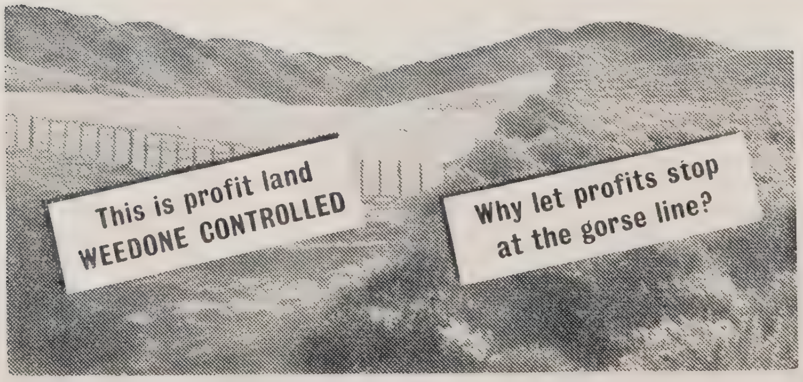

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Peas for Canning: A New Industry in North Taieri

By G. A. HOLMES, Superintendent, Department of Agriculture Invermay Research Station

THE growing of garden peas for vining has become of importance in the Pukekohe, Hastings, and Nelson districts, where the technique of growing and harvesting the crop is now well understood. In 1949 a Dunedin firm decided to investigate the possibilities of this crop for Taieri, and requested the Department of Agriculture to sow a trial area to obtain information on methods of sowing, period from sowing until maturity, and yield of shelled peas per acre. A successful trial was conducted in the 1949-50 season at Invermay Research Station and an industry new to the southern provinces has been established at North Taieri and promises to expand to supply the increasing demand for canned peas.

Greenfest peas in crop ready for cutting.

THE trial was sown on 24 November 1949 and the peas were fully mature on 7 March 1950, when a small measured area was mown and the pods picked and shelled by hand. The yield obtained in this way worked out at over 3 tons per acre, but this was considered as probably higher than would be saved by vining. The remainder of the area was left to ripen for seed, and it was noticeable that the peas remained in good condition for canning for about a fortnight, indicating that the Taieri district might have advantages compared with northern districts, where ripening tends to take place more quickly.

Contracts Placed

In 1950 contracts were placed with growers for 75 acres, sowing dates being spaced from mid-October until mid-December. The season proved most unfavourable for the earlier sowings, as drought conditions prevailed from August until Christmas. Germination was somewhat erratic and growth was slow, and drought-resistant weeds such as fat-hen and fumitory caused trouble in some crops. Later-sown crops drilled after a period of fallow and favoured by midsummer rain were mostly very clean and filled well. An area of 10 acres grown at Invermay yielded over 2¼ tons of shelled peas per acre and showed a gross return of about £55 per acre.

The sowing season in 1951 again proved unfavourable; excessive rainfall made it difficult to carry out sufficient cultivation and to get the land in good condition for drilling. Where the soil lies cold and wet after drilling there is likely to be a poor strike, giving a thinner crop and inadequate smother for keeping weeds out.

Place in Rotation

Provided the paddock is free of perennial weeds, especially couch, docks, and Californian thistle, a crop of peas may be taken almost anywhere in the rotation. If sown late in the season it gives time for cleaning the land, and if there is a good strike, all annual weeds should be suppressed.

Peas are regarded as a fertility-building crop and so an excellent preparation for wheat. Pea crops which are harvested early can be followed by autumn-sown permanent or temporary pasture or by a catch crop of greenfeed.

The green-crop loader leaves the paddock very clean.

Soils and Cultivation

Peas for vining are grown only on level, first-class soils of moderate to high fertility. Where the fertility is extra high there is a risk of too much growth of haulm, especially in a wet season. A good, open, sunny paddock free of shade from high hedges or trees should be chosen. On land now considered second class there are prospects of growing the crop if the fertility can be built up.

The importance of early, deep, and thorough cultivation cannot be overstressed. If old pasture is being broken up for peas, it is advisable either to surface disc before ploughing or to use the digger plough with skim coulters to make sure of burying all the old turf; otherwise pieces of turf left on the surface will be picked up by the pea loader. Harrowing at intervals for a few weeks before sowing is necessary to kill successive strikes of annual weeds.

Manuring

The usual practice in the Taieri district is to sow 1½cwt. to 2cwt. of reverted superphosphate, serpentine superphosphate, or "super. compound"

Mower and side rake leaving windrows ready for loading.

with the seed; some growers have used a 50 : 50 mixture of fine bonedust with serpentine superphosphate. No fertiliser trials with peas have been carried out at Invermay yet, but a series of trials may be planned for some future season to study the comparative effects of various forms of phosphate, as well as the value of potash and of minor elements such as molybdenum. As the produce is threshed by the viner, the measurement of yield from a large number of plots is difficult.

The seed should be treated before sowing with a suitable fungicidal seed dressing, and fields known to be infected with pea wilt should be sown only with wilt-resistant varieties. These were listed in the "Journal" for February 1952.

Varieties

At present the only varieties being grown are William Massey for early crops and Greenfeast for main and late crops. Seed is supplied to growers by the canning firm and great care is taken to obtain seed from crops which have been carefully rogued.

In the 1950-51 season a variety trial was conducted at Invermay using new varieties produced by the Crop Research Division of the Department of Scientific and Industrial Research. Yields obtained by hand picking at the stage of full maturity of each plot showed that two of these new crosses were substantially heavier yielding than the standard commercial varieties.

Drilling and Weed Control

The sowing rate used at Invermay has been 3¼ to 3½ bushels per acre put through the ordinary grain drill. The internal force feed (coarse side) appears to cause no loss through cracking seed of small or medium size. For large-seeded varieties a cup feed drill would be preferable. To secure good cover without crowding of seedlings in the rows drilling at 3½in. spacing with Blackmore coulters has been suggested as worth a trial.

After drilling the paddock should be cross-harrowed and then rolled to crush or press down clods which might otherwise be picked up by the loader.

On clean land if the peas strike well there should be no room for weeds to grow. Where annual weeds make their appearance, spraying with one of the proprietary compounds made specially for use on pea crops may be resorted to.

In the 1951-52 season spraying trials were carried out at Invermay using 5 different chemicals at varying rates and at different stages of growth of the crop. The trial showed that hormone weedkillers were unsuitable, but that spraying with D.N.B.P. (ammonium salt of dinitro ortho secondary butyl phenate) preparations was effective against most annual weeds and did not damage the peas. These preparations, however, require care in handling, as they are poisonous if absorbed through the skin. They are much more effective in hot weather.

Harvesting

Close contact is maintained with growers by the staff of the canning firm, and notice is given to cut each crop as it reaches the stage of maximum yield and before the peas begin to lose their tenderness. One vining unit handles the produce of about 80 acres over a period of about 12 weeks. The peas are cut in late afternoon and two 6-ton loads of vines are loaded in the evening and two or three more loads early next morning. Vining begins at 5 a.m. and must be completed by 11 a.m. to permit canning of the whole day's output on the same day as the peas are shelled. The aim is to reduce the time from vine to can to a minimum.

After trials of various methods of cutting it has been found that the most efficient arrangement is a 6ft. tractor mower fitted with pea fingers followed by a side rake direct-coupled to a tractor. This method requires only one man and leaves the cut ground very clean, so that no vines are crushed by the tractor on its next round.

The canning firm hires out a green-crop loader, which picks up all cut vines cleanly without waste.

Pea Silage

The viner handles a 6-ton load of vines, if dry, in 1 to 1½ hours. From a well-filled crop about 1½ tons of shelled peas per load may be obtained, leaving 4½ tons of pea haulms to be returned on the back trip of the lorry to the grower for each load of vines sent in. If autumn feed is scarce, haulms can be spread for cattle or sheep feed, but usually they are stacked or pitted for silage.

Pea haulm silage is proving of particular value to farmers who have dairy herds for town supply to supplement their roots and hay during winter. For sheep farmers it can be held as a reserve for ewes before lambing.

Meteorological Records for August

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	54.2	+ 3.2	65.2	37.6	8.94	23	+ 2.14	3.58	8	134.2
Auckland	160	54.2	+ 2.0	65.3	41.4	6.79	16	+ 2.37	1.66	8	140.2
Tauranga	10	52.0	+ 2.3	65.7	33.7	6.82	18	+ 2.07	2.81	4	159.8
Ruakura	131	49.7	+ 2.1	64.9	29.1	2.44	13	— 1.65	0.77	4	146.2
Rotorua	969	48.8	+ 2.3	65.7	30.2	5.47	12	+ 0.57	2.10	4	143.1
Gisborne	12	50.3	+ 0.6	66.2	33.8	7.33	25	+ 3.47	1.18	28	106.4
New Plymouth ..	160	51.2	+ 1.6	62.0	36.8	4.55	11	— 1.20	1.13	4	184.5
Napier	5	49.9	+ 0.8	61.0	34.3	6.95	19	+ 4.02	1.88	28	126.5
Karioi	2125			62.0		3.31	14	— 0.90	1.05	14	
Wanganui	72	49.3	+ 0.2	65.8	29.3	1.97	9	— 0.98	0.66	4	159.1
Palmerston North .	110	50.4	+ 2.7	65.9	30.0	2.32	12	— 1.43	0.70	28	155.9
Waingawa	350	47.7	+ 1.8	63.0	25.8	5.75	17	+ 1.57	0.91	13	114.5
Wellington	415	48.4	+ 0.8	63.8	35.0	3.75	17	— 0.90	0.82	15	122.9
Nelson	5	46.7	+ 1.9	62.7	25.4	1.65	8	— 1.49	0.58	28	156.1
Blenheim	12	47.6	+ 0.8	63.2	28.9	2.85	14	+ 0.52	0.77	9	139.3
Hokitika	12	47.6	+ 2.9	66.6	28.3	0.74	7	— 8.30	0.45	4	137.7
Hanmer	1225	42.0	+ 0.6	65.0	20.0	8.82	15	+ 5.24	2.30	29	
Christchurch ..	22	46.1	+ 1.8	59.8	28.4	3.79	12	+ 1.74	1.08	14	116.3
Ashburton	323	44.5	+ 0.8	68.0	22.6	3.71	12	+ 1.39	1.23	9	125.9
Timaru	56	43.0	— 0.8	63.6	25.5	1.45	8	— 0.01	0.47	9	106.7
Alexandra	520	42.2	+ 0.8	65.2	20.3	0.03	2	— 0.60	0.02	5	141.6
Taieri	80	43.4	— 0.3	65.8	23.2	2.18	11	+ 0.44	1.24	9	149.6

Treatment of Lawns in Spring

SPRING is a busy time for home gardeners, especially for those who wish to put their lawns in order. By knowing what to do and how to do it, the gardener can expect to be well rewarded for time and money spent in lawn renovation, and in this article E. A. Madden, Agrostologist, Department of Agriculture, Palmerston North, gives advice on the best methods for making a good lawn.

OLD and new lawns can deteriorate through lack of proper attention, and even the best-tended ones can be spoilt by natural agencies such as summer drought or winter waterlogging. Also, the turf may be damaged quite considerably by grass-grubs, porina (*Oxycanus*) caterpillars, or worm casts.

Any openness of the turf, regardless of its cause, may and usually does lead to the establishment of weeds, clovers, coarse grasses, and moss. Eradication of such undesirable plants is relatively easy, but little purpose is served by getting rid of them if the space they occupy is going to remain bare.

A basic factor in any lawn improvement work is to produce and maintain a dense turf of fine grasses so that there is little or no room for weeds to become established. This can be done by providing sufficient plant foods to keep the grasses in a healthy and vigorous condition, and the treatment which does this also kills many weeds and checks the growth of others.

Fertiliser Topdressing Essential

Topdressing with fertiliser is a prerequisite in lawn making and maintenance, and two formulas are recommended, each for a particular purpose. The first is a mixture of three parts of sulphate of ammonia and one part of superphosphate; the second consists of three parts of sulphate of ammonia and one part of sulphate of iron. The former mixture is for more general use, for example, when it is necessary to promote a better growth of the fine grasses and to check or kill some common lawn weeds. The mixture containing sulphate of iron is especially suitable for lawns where moss or clover is fairly thick. Both mixtures should be applied at the rate of 1oz. per sq. yd., and to be most effective for burning weeds the fertiliser should be broadcast evenly while the lawn is wet with dew. Both these fertiliser mixtures tend to make the soil somewhat acid. This is important, because lawn grasses prefer moderately acid soils, whereas most weeds and moss thrive best on soils that are "sweet" or non-acid. The latter condition applies also to *Poa annua*, a shallow-rooted grass that is regarded as a weed because it dies out in midsummer and leaves bare patches in the lawn.

Some weeds are relatively resistant to the burning effect of sulphate of ammonia. They can be dealt with quite easily by spraying them with one of the hormone weedicides, but it is wise to get the turf grasses into a healthy and vigorous condition by correct manurial topdressing before using the spray treatment.

Elimination of *Poa annua*

As *Poa annua* is somewhat resistant to the burning effect of sulphate of ammonia and is not seriously affected by hormone weedicides, it may be necessary to apply grass-killing chemicals such as T.C.A. or I.P.C. T.C.A. is a white powder readily soluble in water and is applied at the rate of 1oz. to 30 sq. yds. in a gallon of water. Most forms of I.P.C. are water-soluble and are applied at a rate of 4 tablespoons to 30 sq. yds. in a gallon of water. The quantity of water may be varied to suit the type of sprayer. In all cases the application should be made when the *Poa annua* is in the seedling stage. These rates of application have little effect on established perennial grasses. The elimination of *Poa annua* should not be attempted in newly sown lawns.

Broad-leaved weeds such as flatweeds are readily destroyed with preparations of M.C.P. or non-volatile preparations of 2,4-D at a rate of 1 tablespoon to 30 to 40 sq. yds. in a gallon of water. The lawn should not be mown for a week before and after the application. In newly sown lawns hormone weedkillers should not be applied until the grasses have begun to tiller. As a rule weed eradication and patch sowing are better done in autumn than in spring, except in cold districts. An exception is the eradication of *Poa annua* with T.C.A. and I.P.C., because, if sprayed in spring, the plants will be killed before they produce seeds. If spraying is delayed until autumn, it is almost certain that the seedling *Poa annua* plants will not appear sufficiently early to enable them to be killed soon enough to allow resowing of the patches at a favourable season.

Control of Coarse Grasses

Coarse grasses such as Yorkshire fog (and paspalum in warm districts) make lawns unsightly and, unlike some species, can persist and spread, even when kept closely mown. Eradication by digging them out is not always justified, and in such circumstances they can be reduced in size and vigour quite appreciably if the prostrate stems and leaves are lifted with a rake so that they can be cut off with the mower. If this is done several times during spring and summer, Yorkshire fog may be almost eliminated from the lawn. More drastic treatment is necessary for paspalum, however. The crown of the plant should be cut into vertically to a depth of an inch or two with a sharp spade, a succession of cuts being made at 1in. intervals in one direction and then repeated at right angles. This treatment severs the prostrate stems, which then can be removed easily by light raking. Keeping the plants in a relatively weak state by this process enables the fine grasses to spread slowly and so smother the coarse ones. Both Yorkshire fog and paspalum may also be eradicated with spot treatment of T.C.A.

[*Green and Hahn Photography Ltd. photo.*

Small plants of these species can be entirely removed if two spade cuts are made vertically into the crown of each plant in the form of a cross and each quarter of the plant is then lifted out.

The eradication of weeds, moss, and the like, and sometimes the damaging factors mentioned at the beginning of this article, will leave numerous patches which should be resown with turf grasses. Spring is not normally a good season to establish grasses, but unless dry conditions prevail while the plants are very young, they should have a good chance of surviving, especially if they can be watered occasionally.

Not infrequently there are shallow depressions in the surface where weeds once grew. These should be lightly scarified with a sharp-pointed rake and then filled by addition of the necessary quantity of free-textured soil.

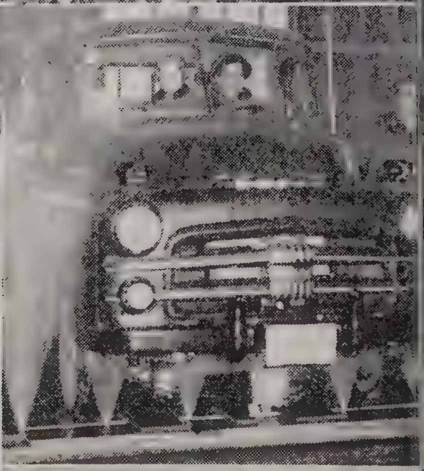
Recommended Seeds Mixture

A seeds mixture containing two or three parts of chewings fescue to one part of Certified browntop should be broadcast lightly at a rate of up to 1oz. per sq. yd. on the patches, after which a dressing of the sulphate of ammonia and superphosphate mixture should be given. The reseeded patches should be lightly raked to cover most of the seed and, if possible, some sieved soil should be sprinkled thinly over the patches to ensure more effective coverage of the seed. Rolling the reseeded areas is not recommended, as this often leads to the formation of a hard surface crust through which seedlings do not emerge easily and freely.

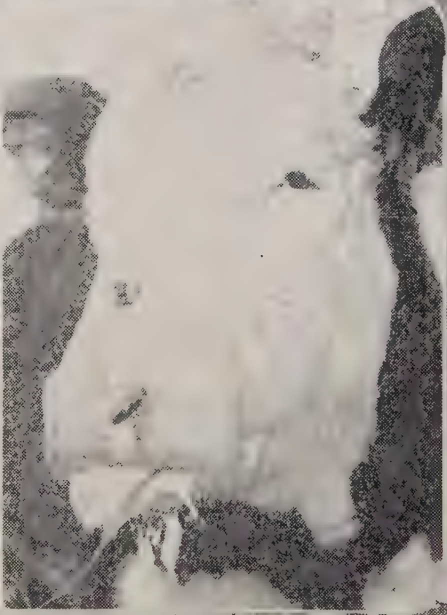
The lawn should be closely mown until the seedling grasses appear on the newly sown patches, and from then onward the mower should be raised slightly so that the new grass is not cut too short. This procedure should continue for a few weeks, after which the mower may be readjusted to cut closely again. As the root system of young grass plants is not particularly deep and strong, it is necessary to have a sharp mower; otherwise the seedlings may be torn out instead of being mown.

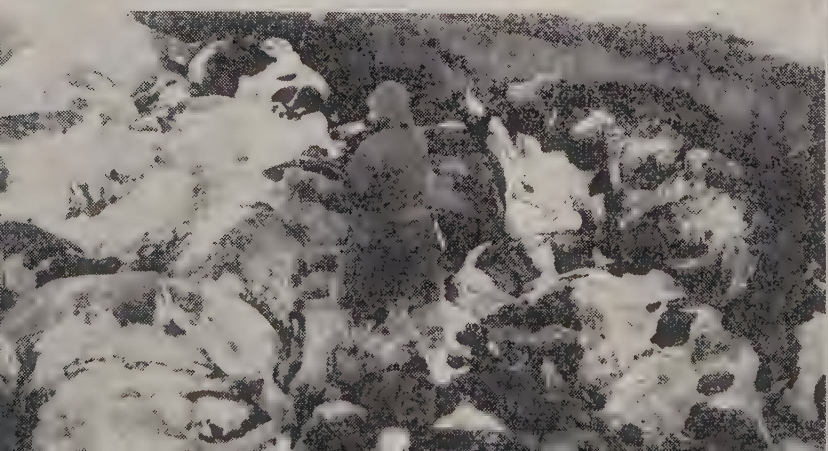
Topdressing with fertiliser at 3-monthly intervals combined with regular mowing will have much to do with the making of a really good lawn.

CANADA'S FIGHT TO CONTROL FOOT AND MOUTH DISEASE



To bring the recent outbreak of foot and mouth disease under control Canada has had to pay a high price in the destruction of stock, inability to export meat, loss of production, and cost of emergency services. These photographs taken for the Information Service of the Canadian Department of Agriculture show some of the measures necessary to eradicate the disease in affected districts and to prevent its spread to other farming areas. Top left—Thorough disinfection of clothing worn by people handling infected and suspected animals. Top right—Filling in a pit of slaughtered animals with a cover of earth. Middle left—Affected animal with typical symptoms of drooling and protruding tongue. Middle right—Disinfection of a vehicle in the quarantine zone. Bottom left—Spreading quicklime on carcasses in a slaughter pit to speed disintegration. Bottom right—Tacking a quarantine notice on a farm gatepost.





HEADING PHOTOGRAPH: Slaughter of infected and suspected cattle in Canada by members of the Royal Canadian Mounted Police. The animals were herded into pits 10 to 12ft. deep dug by bulldozers and after slaughter the pits were filled in. The Canadian authorities were hampered in their efforts to stamp out the disease by the intense cold, which made bulldozing of the pits and disinfection of clothing, vehicles, and equipment very difficult. Canadian Department of Agriculture photo.

Keeping Foot and Mouth Disease out of New Zealand

By W. D. ROSS, Livestock Superintendent, Department of Agriculture, Palmerston North

THE spread of foot and mouth disease in Britain and its appearance in Canada have caused considerable concern in New Zealand, as the possibility of infective material reaching here has been greatly increased. Officers of the Department of Agriculture have always been on the alert to prevent entry of the disease, imported stock pass through island quarantine stations, and what are considered watertight Acts and Regulations operate to prevent the virus of foot and mouth disease coming to New Zealand in ships or aeroplanes. However, Acts and Regulations alone are useless without continual vigilance at all ports and aerodromes to see that the Acts and Regulations are effective.

IN combating a virulent disease like foot and mouth disease the general public and all farmers must be fully informed on the part they can play in helping to keep the disease out of New Zealand. Should it gain entry, farmers must be able to recognise it and report it immediately. In countries where the public and farmers are not fully aware of the dangers, as in Mexico, the disease can gain such a big hold and spread so rapidly that control measures fail and the whole economy of the country is in jeopardy.

Therefore the main essential in any scheme to keep disease out of a country and to control it should it get in is to have an informed body of public and farmers. A few hours can make all the difference between nipping infection in the bud before damage is done or allowing it to spread to paralyse the entire livestock industry.

For the last year or two an American film on foot and mouth disease called "Outbreak" has been shown to gatherings of farmers. On a recent tour of this film many questions asked by farmers were answered by veterinarians present at the screenings. The following selection of questions and answers contains much information of importance on the disease, measures to prevent its entry, and methods of its control and eradication.

Symptoms of Disease

Question: What are the first symptoms of the disease?

Answer: In the milking cow the first symptom is a quick and complete drop in milk yield, indicating a rise in temperature. This is followed by dribbling of saliva from the mouth and sucking and smacking of the lips. Blisters appear on the tongue and inside the mouth and this symptom is quickly followed by shaking of the feet as if the cow were trying to shake off mud. Blisters appear at this stage at the skin-horn junction or coronet and between the claws of the hooves. The cow becomes very lame.

The main feature is the appearance of these symptoms in several of the herd at the same time and the rapid spread to the rest of the herds and animals in the neighbourhood.

If there are pigs on the farm, they rapidly become infected; blisters appear on the snout, the coronets, and between the claws, and the pigs also go lame.

Sheep on the same farm can become affected with foot and mouth blisters and show the typical symptoms. The

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mouth blisters are less common in sheep. Horses are immune to the disease.

There are two other diseases which can be confused with foot and mouth disease, but deciding whether the symptoms are caused by these diseases or foot and mouth disease is a job for the veterinarian on the farm at the time of the outbreak. Specimens from suspicious cases must not be removed from the farm. All diagnostic tests are made on the spot.

Any symptoms of blisters on the mouth or feet in cattle or pigs should be reported immediately to the nearest veterinarian. Stock owners near ports or aerodromes are asked to be particularly alert. A hundred false alarms are better than one outbreak.

NO ADMITTANCE
FOOT & MOUTH DISEASE

[*"Picture Post" photo.*

The cost of controlling Britain's recent serious outbreak of foot and mouth disease, the worst for 10 years, runs into millions of pounds. Here a housewife on a farm in a quarantine area receives provisions across a barrier of disinfectant-soaked straw while a policeman supervises.

Carrier Danger

Question: What can carry the disease?

Answer: The most important and dangerous carrier of the disease is an infected animal, discharges from which such as milk, urine, and blood carry the virus. Animals which can become infected are cattle, sheep, pigs, goats, deer, hedgehogs, rats, and guinea pigs, but all animals and birds can carry the virus of the disease mechanically on their feet, mouths, or coats if they have been near infected animals or discharges from infected animals.

That is why if the disease broke out on a farm in New Zealand all infected and in-contact stock which can become infected would be destroyed and burnt or buried. The horses, dogs, cats, poultry, and other animals on the farm which do not become affected by the disease themselves would be disinfected and not allowed off the farm until it was proved to be free from any possibility of infection.

All persons on the farm would have to disinfect or burn all clothing worn when they were in contact with stock at the time of the outbreak and would have to use antiseptic footbaths for shoes, etc., on leaving the farm for even a few minutes. All wheeled vehicles would have to be thoroughly cleaned and disinfected before leaving the farm and no produce such as fruit, vegetables, eggs, butter, and cheese could leave the farm until it was declared safe.

Although susceptible stock are not now being imported into New Zealand from countries having cases of foot and mouth disease, all precautions are taken to avoid the entry of the virus through New Zealand ports.

As infection can start months later from contaminated fodder or straw, all contaminated hay and straw on the farm would be burnt. Buildings, fences, posts, battens, races, yards, etc., would be sterilised and all loose litter raked up and burnt and any decayed or rotten wood pulled out of buildings and burnt. All rats, hedgehogs, and other wild life would be exterminated and a constant patrol of the area maintained to stop cats and dogs and other animals from straying on to the farm until it was safe.

All neighbouring farms would be under a standstill order and daily patrol, and all traffic would be stopped in the area. That is how a small outbreak would be dealt with; a larger spread would tie up a whole countryside. The whole of England and part of Scotland were tied up for a few weeks to halt the spread during their recent outbreak. What would happen in New Zealand in similar circumstances can be imagined. All dairy factories, freezing works, saleyards, etc., in an infected area would be shut down and all stock movements halted, all cars would be disinfected at the borders of the affected area, and all passengers on buses, trains, aeroplanes, and other forms of transport would have to walk through antiseptic footbaths. In fact all normal everyday activities would be affected and a large number of people would be seriously inconvenienced.

Regulations to Deal with Disease

Question: If foot and mouth disease broke out in New Zealand, would regulations have to be made to deal with it or are they ready to be put into action?

Answer: All the Acts and Regulations required to deal with an outbreak of any disease like foot and mouth

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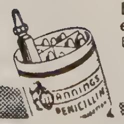

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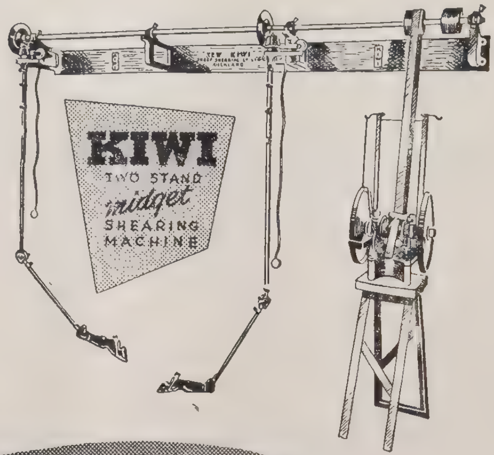

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exist in New Zealand. The outbreak of swine fever in Wellington several years ago was caught in time and cleaned up. New Zealand is one of the few countries free of that disease and also of sheep scab, which was cleaned up many years ago. Officers of the Department of Agriculture know what to do should an outbreak occur and all men and equipment required could be mobilised within a few hours.

Question: What is the nearest place to New Zealand where foot and mouth disease exists?

Answer: New Zealand is practically surrounded by infected countries—Indonesia, Malaya, India, China, Argentina, and Mexico. The disease is well established in these countries, which are now only a few days or even hours distant by aeroplane. That is why all overseas aircraft are met by Department of Agriculture officers on arrival in New Zealand for rigid checking for plant and animal diseases and pests. Because of the short time taken by air transport no stock are allowed to land in New Zealand from overseas aircraft.

Question: How long will the virus live on boots and clothing, in straw, and on other contaminated material?

Answer: Under conditions favourable to it, low temperatures and lack of light, the virus can survive for 5 months on such materials.

Chilled meat is infectious as long as it is marketable. The virus has been recovered alive from carcasses frozen for 100 days; there is evidence of frozen meat being infective for a year. Chilled and frozen meat has been responsible for several outbreaks in Britain. The wrappings and juice from the meat on thawing are very dangerous. Bones from infected carcasses can cause infection if not boiled for at least an hour. Few people realise that the bones of a large roast or bones in a chop even if well cooked may not reach pasteurising heat. The marrow in such undercooked bones can thus be infective.

Imported Stock Quarantined

Question: Are stock quarantined before they come to New Zealand?

Answer: Yes. Normally stock for New Zealand are taken only from clean areas in Britain and are quarantined at a clean quarantine station there. After the long sea voyage of about 6 weeks they are quarantined on arrival in New Zealand at Motutapu Island or Somes Island for another 30 days. Very strict and far-reaching precautions are enforced in veterinary inspections and the safety of all fodder and materials used in the British quarantine station and on the voyage. However, it has been decided as a safeguard that in the meantime no livestock susceptible to the disease will be shipped from Britain to New Zealand.

Question: Can humans get foot and mouth disease?

Answer: Young children can die from drinking milk from cows affected with the disease, but adults are practically immune.

Question: Are aeroplanes from overseas disinfected?

Answer: Yes. All overseas aeroplanes on arrival in New Zealand are met by officers of the Customs Department, Health Department, and Department of Agriculture and all steps are taken to prevent the landing in New Zealand of any materials which could carry foot and mouth disease. The aeroplanes are fumigated and all passengers' luggage checked and certificates of sterilisation produced if it has come from an infected country. Certificates of sterilisation must be produced if passengers are farm immigrants from an infected country.

One recent arrival in New Zealand had a pair of slippers in her case badly soiled with earth. Because these had come from an infected country, they were destroyed.

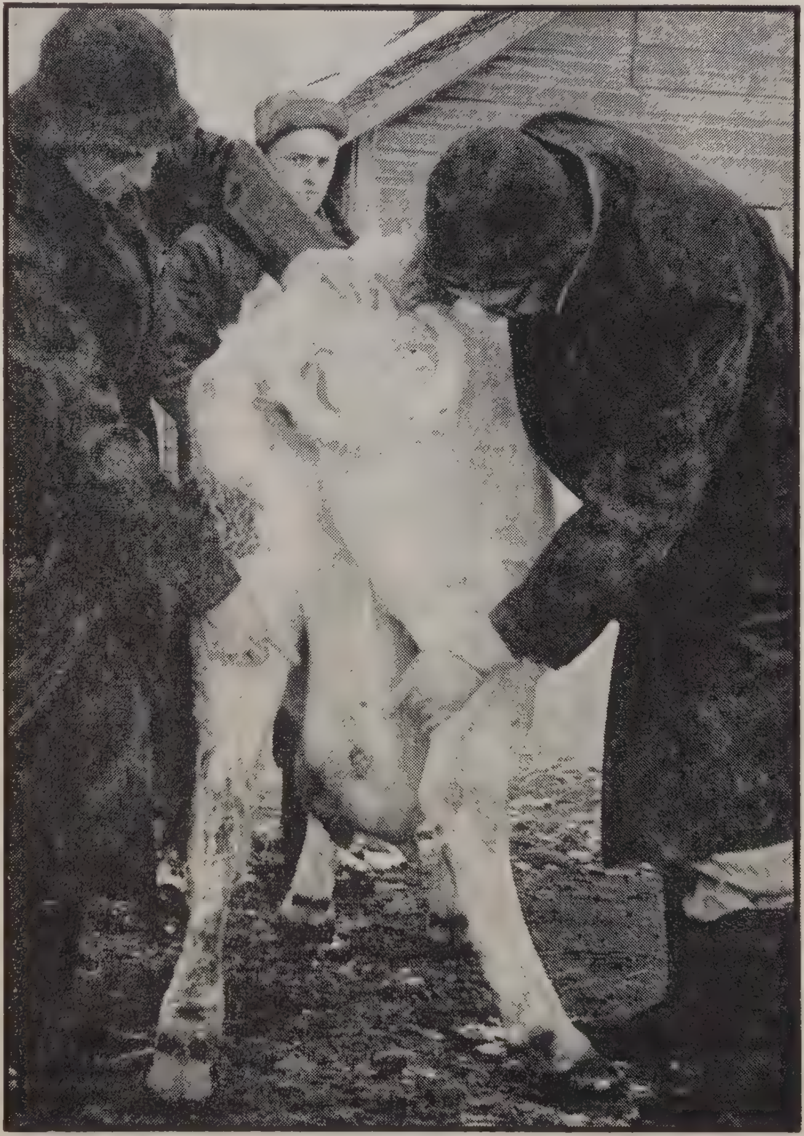
Question: Is vaccination satisfactory?

Answer: The disease would not be tackled in New Zealand with vaccines, but the slaughter policy would be used. Vaccines are of limited use in countries where the disease is always present or where the spread has got out of hand. Vaccination is then used to build up buffer zones to halt the spread, somewhat like the firebreaks in a forest.

There are three main types of the virus and also a number of variants of each type. Vaccines for one type give no protection against the others and give immunity for only 6 months against the type for which they are used. To be efficient any vaccination must be preventive and therefore must be used at least 3 weeks in advance of an outbreak.

Compensation for Stock Losses

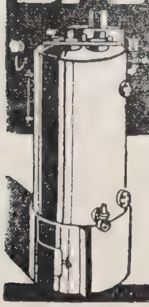
Question: What about compensation? Who values the animal? Where does the money come from?



[*Canadian Department of Agriculture photo.*

Canadian veterinarians examining a sore on the udder of a cow infected with foot and mouth disease. The rubber hats, coats, boots, and gloves worn by veterinarians handling infected and suspected stock were thoroughly disinfected before they entered and left each farm.

SPEEDWAY



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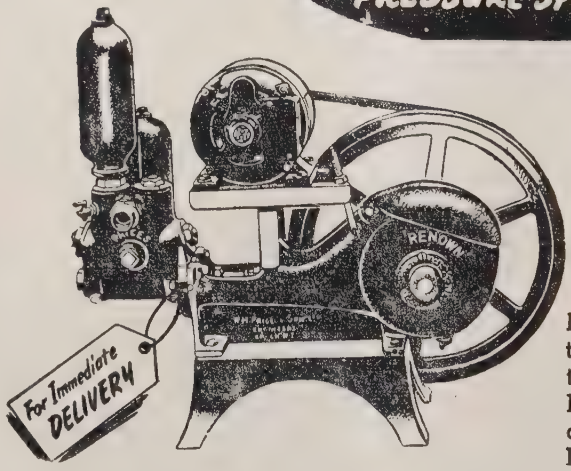

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Answer: In the event of an outbreak of foot and mouth disease the Government would take all reasonable steps to compensate farmers adequately for stock losses and loss of production incurred through the disease and the measures to control it.

Question: On a large run would all stock be destroyed or just paddock by paddock?

Answer: This would depend entirely on the layout of the run and on how much movement of stock, horsemen, dogs, and people there had been and the likelihood of the stock in the infected paddocks having spread the disease. The whole run would be quarantined and all affected stock and in-contacts shot and buried or burnt. If part of the run were separate and isolated and if there were no danger of spread or contact, it would be treated as a contact and held under rigid quarantine standstill supervision and patrol.

In all cases needless destruction of stock is avoided, but no animal could get the benefit of any doubt if it was likely to have been in contact with infected stock or pastures during the infective stages of the disease on any run, however large.

Question: Can the disease be cured?

Answer: With some types of the virus, particularly in countries like New Zealand where stock have no resistance to foot and mouth disease, all the animals would become infected and mortality would be high. Those surviving would be so debilitated that they would be economically worthless.

However, the disease is mainly not a killing disease except for the unborn and the very young. Animals can recover, but are shadows of their former selves and usually useless for breeding.

Question: Are Australians taking some precautions?

Answer: Yes. Australia, in common with all countries which do not have the disease, has the same stringent laws to try to keep it out. Australia is very conscious of what can happen when diseases become established in a country and is paying dearly in stock losses caused by pleuropneumonia in cattle. This is another scourge of stock which has been kept out of New Zealand through quarantine laws and vigilance in the past. The only outbreak here was in the 1860's, and it was rapidly eradicated by a stringent slaughter and local quarantine policy.

Australia is also much nearer to India, Malaya, and Indonesia and has great problems in patrolling her thousands of miles of coastline to stop entry of stock from these infected countries, which are only a few hours distant by air.

Dumping of Ships' Garbage

Question: Is the 3-mile limit for dumping garbage from overseas vessels sufficient?

Answer: Yes. This has been accepted internationally as the safe limit to dump garbage, particularly in New Zealand's deep coastal waters. However, the 3-mile limit is not a hard-and-fast limit. Where shore currents would bring garbage back to the coast in a short time the garbage has to be taken far enough out to ensure that it will not wash back.

It all depends on local currents, tides, and weather, but 3 miles is the minimum distance. The difficulties in this respect are so great in some of the biggest ports in New Zealand that all overseas garbage is carefully burnt in destructors on shore.

[*Canadian Department of Agriculture photo.*

Speed in moving from one area to another was important to Canadian veterinarians in combating foot and mouth disease and specially equipped tractor-treaded "snowmobiles" of the type shown above enabled them to cross snow-covered territory quickly.

Question: Horses' feet and covers are disinfected in New Zealand ports. Could the virus live in horses' coats and hair?

Answer: Equipment such as halters, brushes, rugs, and buckets accompanying animals coming to New Zealand from free areas in Britain is sterilised, and all surplus fodder and bedding are burnt on arrival. Furthermore such fodder and bedding are permitted only from areas free of the disease. It is therefore not possible for live virus to be present on the coats of horses infected under these conditions.

Persistence of Virus

Question: Does the disease lie dormant? Why does it break out again?

Answer: The persistence of the virus can cause the disease to flare up unexpectedly in places far removed from the original site of the disease; for example, frozen meat from Argentina has caused outbreaks in Britain, European immigrants' clothes are thought to have caused the outbreak in Canada, and migratory birds bringing infection from Europe have been blamed for some of the outbreaks on the east coast of England.

However, the virus cannot live or multiply outside the animal body for very long, a year perhaps at the most, apart from that on frozen meat or in special laboratory conditions and cultures. This means, therefore, that to survive and multiply the virus must be constantly passing from animal to animal.

In a country backward in agricultural methods which always has the disease there are cases all the time and the virus survives. When this virus reaches a country where stock are intensively farmed and herded in large numbers it no longer smoulders quietly, but flares up. Despite all the control of the more advanced countries there are always many danger spots of infection in the world waiting a chance to flare up if given the opportunity.

Modern speedy transport and the exchange of peoples, stock, and products between countries allow the rapid carrying of infection to clean countries. Therefore, until all countries in the world are free of foot and mouth disease rigid supervision of all potentially infective material reaching New Zealand by sea or air will have to be maintained.

The problem is an international one and is being tackled in Britain and America at present. A sum of $10,000,000 has recently been voted in America for foot and mouth research and it is hoped to see foot and mouth disease if not eradicated at least reduced in virulence.

Question: Could a Meat Inspector see the disease in a carcass?

Answer: Yes. If the animal got past the thorough ante-mortem inspection in the yards, the disease would be discovered on inspection after slaughter. Apart from the obvious vesicles and blisters on the tongue, inside the mouth, and at the junction of the horn and skin, there are internal evidences of the disease.

Question: What is the incubation period of the disease?

Answer: From 48 hours up to 10 days. The period of 3 to 5 days is most usual. It very rarely exceeds 10 days.

Question: Are animals vaccinated against foot and mouth disease before they come to New Zealand?

Answer: No. Stock from a country where foot and mouth disease vaccination is practised would never be accepted for New Zealand. They would be a grave potential danger owing to the carrier possibility.

Means of Entry of Disease

Question: What steps are taken to prevent foot and mouth disease coming to New Zealand?

Answer: The disease could enter New Zealand either by an infected animal or on material such as mud, straw, sacking, and footwear contaminated with the virus. Susceptible animals could enter only from Australia, where the disease does not exist.

Importations of potentially infective materials are very strictly controlled. Hay, straw, similar packing materials, and used sacks may enter only if satisfactorily sterilised. Prohibition of the importation of soil in any form is rigidly enforced at the ports. The baggage and effects of agricultural immigrants may be examined on immigrants' arrival in New Zealand if they have no clearance from their native country showing that their effects have been disinfected.

Question: What about imported plants?

Answer: These have all soil removed from their roots on arrival in New Zealand and are disinfected by officers of the Horticulture Division of the Department of Agriculture, who inspect all plants, bulbs, fruit, nuts, etc., for plant diseases or parasites.

Question: If migratory birds can carry the virus to Britain from Europe, can migratory birds carry the virus from infected countries to New Zealand?

Answer: Not at present, as the few migratory birds coming to New Zealand take so long to travel from infected countries that the virus cannot survive. If, however, foot and mouth disease became established in Australia, Tasmania, New Caledonia, or Norfolk Island, there would be cause for anxiety.

Question: It seems that the Department of Agriculture is taking every precaution against the entry of foot and mouth disease and has blocked every imaginable means of entry. How then could the disease possibly come here?

Answer: Laws, Acts, and Regulations, being man made, can be and are knowingly or unknowingly beaten, and as long as there are ships and aeroplanes coming to New Zealand from infected countries risks are run. These risks have to be taken if New Zealand is not to be wholly isolated or so tied up with preventive restrictions that international trade is impossible.

Every conceivable method of entry has been blocked and a lesson drawn from the experience of less fortunate countries. The task would be impossible without the intelligent help of the public in imposing restrictions and in bringing to notice any suspicious symptoms in stock or any weaknesses in the precautions. By concerted effort it is hoped to keep foot and mouth disease out of New Zealand.

Development of Sand Country in Australia

IN the barren heart of a 6,000,000-acre region known as the "90-mile desert" in southern Australia a new agricultural project has been begun. By the use of the trace elements zinc and copper mineral deficiencies that have prevented settlement for more than a century have been corrected. An Australian life assurance society has taken over 750,000 acres and by larger-scale farming methods, aided by science, is turning it into 800- to 1000-acre farms. These are to be handed over to the young men who are helping to build the scheme.

The upper photograph shows scrub being smashed down by a 50ft. log drawn by powerful track-laying tractors. By this method 30 to 50 acres of scrub are broken down in an hour. Some of this country is burnt; other parts are ploughed in. The lower photograph shows large-scale ploughing operations which are being carried out with tractor-drawn disc ploughs. Two 8-furrow ploughs, in tandem fashion, turn over 30 acres of the impoverished desert soil a day.

[*Australian Official photos.*

Ducks and the Household Poultry Keeper

IN New Zealand duck eggs are not as popular as hen eggs for table purposes, and in consequence a limited number only of household poultry keepers run small units of ducks, but the Department of Agriculture does receive from time to time inquiries about the management of these birds. This article, written by an officer of the Animal Industry Division of the Department, summarises the main principles of duck management likely to be of interest to household poultry keepers.

[Sparrow Industrial Pictures Ltd. photo.

Muscovy ducks are raised mainly as table birds.

IN general ducks are not as suitable for household poultry keepers as hens, mainly because small sections do not afford sufficient run space for even a small unit of ducks. On the other hand, it is erroneous to think that ducks cannot be kept successfully without running water or a pond. Even where breeding ducks are kept water is not necessary. Small ponds are undesirable, as they become fouled and unpleasant, while cold running water in winter can retard egg production.

Large Section Essential

As has already been stated in these articles, small runs for pullets and hens are not recommended. The ground becomes fouled, is of no value to the birds, and may well be a source of disease contamination. These poor conditions become accentuated where ducks are kept in runs limited in area, particularly during winter. On the other hand, though the intensive system with a well-designed house without a run can be successful for pullets, it is not suitable for ducks. If kept wholly within a laying shed, ducks would trample the litter flat, foul it, and make essential the cleaning out of the house at short intervals.

Thus ducks are a satisfactory proposition for the householder only where there is a large section with well-established grass or rough herbage over which the birds can range.

Most Suitable Breeds

The two breeds best suited for egg production are the Khaki Campbell and the Indian Runner. Of the latter the fawn-and-white variety is most commonly maintained in New Zealand. Both breeds are excellent for egg production, provided the birds come from good laying strains.

Housing

Housing for laying ducks can be of simple structure, or, as in the warmer climate of the north, where severe frosts are not encountered, no housing at all is required. Under these conditions the birds sleep out on the ground at night, but need some kind of ground shelter such as a hedge or a hurdle or brush fence to break the wind and driving rain. Where a house is provided it can be a simple lean-to structure, solid at the sides and back, with a wire-netting front. The floor may be earthen or wooden, but should be dry. As good ventilation is essential, a 5ft. front is desirable, with back ventilation at the eave in the form of a 4in. to 6in. gap. A house of this height also facilitates the cleaning out of the litter. As rats can seriously disturb laying ducks and may easily adversely affect egg production, a house giving protection against these vermin is highly desirable. Approximately 4 sq. ft. of floor space per bird should be allowed in these sleeping quarters. The floor should have a covering of straw, which should be added to or cleaned out when it becomes matted and dirty. Ducks are not clean birds.

Breeding

Though breeding of ducks is not recommended for household poultry keepers with only small units, where it is desired mating of ducks may be done satisfactorily with birds in either their first or second laying seasons. Six to eight ducks may be mated to a drake for a single-male mating. The number of ducks to each drake can be increased to eight to ten where mass mating, that is, a number of drakes to a flock of ducks, is employed. When ducks and drakes for breeding are being chosen those with long and deep bodies should be selected, and birds with coarse heads should be avoided if good egg production is required. The good laying duck has a fine head with the eyes placed high in the skull.

Reminders for November

Preservation of eggs for winter use is an important job that should be attended to now, if it has not already been done.

If young pullets are due to arrive this month, it is essential to put them in a clean house, and preparations for their arrival are now essential.

New season young, growing pullets should never be run with older laying birds. The latter will bully the young birds, keep them from their food, and consequently stunt their growth.

With the arrival of warm weather a sharp watch should be kept for lice on the birds and for mites under the perches or in the cracks and crevices of the house.

Hatching and Rearing

The household poultry keeper with a small unit of ducks should use broody hens for hatching, a good-bodied, heavy-breed hen being used to cover about 10 or 11 eggs. The hen should be in good condition and fully broody, as the incubation period is 28 days.

For housing her a box or coop with a fine wire-mesh bottom should be placed in a cool place on moist ground. Duck eggs require more moisture than hen eggs for satisfactory hatching, and natural moisture from the ground is an aid to good hatching. In dry weather the soil round the box should be kept moist with water, more particularly during the last week before the eggs are due to hatch. After the second or third day the hen should be taken off the nest daily for about a quarter of an hour, during which she should be fed and watered. Whole maize is an excellent food for broody hens, as it assists to maintain body condition.

Once the ducklings have hatched, if more than one hen has been "set" at

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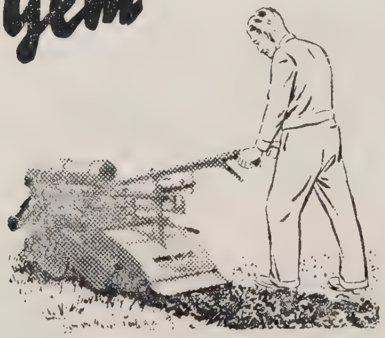

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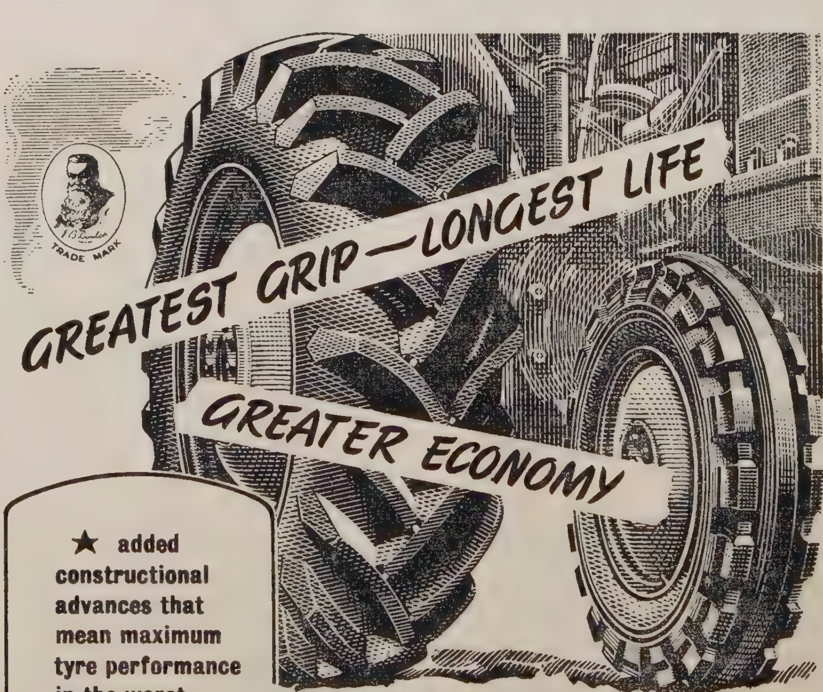

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the same time, it will be possible to give one hen some of the ducklings from those hatched out under two or three other hens, as a hen will brood successfully more ducklings than she can hatch, up to a maximum of about 15 to 18. The hen and her ducklings should be given a coop and be restricted to a limited area with low wire netting for a few days. After this the hen may be permitted to range over a fairly large area, but should be put back in the coop at night for a week or two until the ducklings can safely sleep at night in the open. Here again care should be taken to protect the ducklings against attacks by rats, which will readily kill ducklings during the first week or two of their lives.

Feeding of Ducklings

Ducklings are fed with moist crumbly mash. At the start and for about 10 days young ducklings receive four or five meals of mash daily; the mash is fed on a board or shallow trough. Ample feeding space should be given to prevent the ducklings from scrambling over one another, and the mash should not be put down in deep layers, as it will soon be trampled down into a firm mass and become difficult for the young ducklings to pick up.

Standard chick mash No. 1 is satisfactory for ducklings, but is improved by the addition of 5 per cent. of dried milk powder (½lb. of milk powder to 9½lb. of mash) or alternatively the mash may be moistened with liquid skimmed milk.

When the young ducklings are 10 weeks old they should be fed with standard chick mash No. 2 and meat meal at the rate of 9½lb. of mash to ½lb. of meat meal. Grain is not necessary during the early growing stages, but may be fed when the birds have developed feathering. Grain is best fed from a metal trough and should be just covered with water.

Ample clean water should be available to ducklings and ducks at all times, and it is strongly recommended that it be given in vessels which are both large enough and deep enough to permit the birds to immerse their heads completely.

[Sparrow Industrial Pictures Ltd. photo.

A group of good-type Khaki Campbell ducks.

[Green and Hahn Photography Ltd. photo.

A Khaki Campbell drake. The curled tail feather and the voice distinguish the drake from the duck.

Feeding of Laying Ducks

Laying ducks may be given two feeds of wet mash daily, in the morning and evening; if they are fed on grain and mash, mash should be given as the morning feed and the grain at night. Standard laying mash No. 1 is suitable, but during winter the mash should be reinforced with additional meat meal to the extent of approximately ½lb. to every 10lb. of mash. This extra meat meal is not so necessary in spring and summer if the birds are foraging over a good run and can obtain insects and other food. As for ducklings, the mash must be moist and crumbly and not too sticky, as in this condition it will clog up the birds' beaks. Ducks are heavy feeders and when in full lay will eat 5 to 6oz. of mash per bird daily. They are heavy layers and if production is to be maintained, ample food is necessary. During winter when good green food is short ducks will benefit from the addition of fish oil in the mash at the rate of three tablespoons to every 10lb. of mash.

General Management

Ducks do not require nest boxes, as they drop their eggs in the run or their sleeping quarters early in the day. For this reason they should be confined to a run where they sleep at night, or, if a duck house is used at night, to an area adjacent to it until after 10 in the morning. If allowed to range over ground immediately after feeding in the early morning, they will lay their eggs where it is often difficult to find them, and there will be the added trouble of searching over a wide area. Eggs will not be lost, however, if the birds are confined to a limited run each day up to the time mentioned.

Disease not Common

In general ducks do not suffer from disease to the same extent as other poultry. They are easy to rear as ducklings and have good constitutions as adults. On the other hand they are more nervous than pullets or hens and should be protected against sudden frights from dogs, cats, rats, and other vermin. If severely frightened, they will readily panic and pile up on top of each other in corners; a fright of this nature will often put them out of lay and may even throw them into a partial moult.

[Sparrow Industrial Pictures Ltd. photo.

Hen with Khaki Campbell ducklings.

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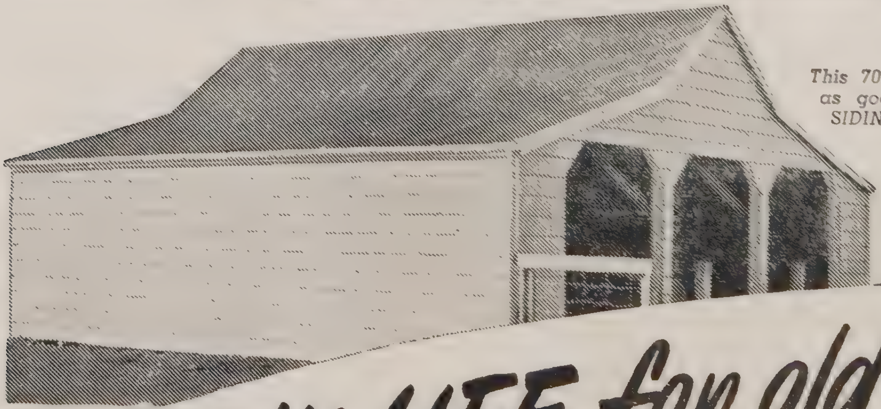

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Measurements: Length, 12½in.; chest, 21in.; sleeve seam, 8½in.

Tension: 8 st. and 10 rows to 1in.

Abbreviations: K., knit; p., purl; st., stitch(es); beg., begin or beginning; cont., continue; tog., together; rem., remain or remaining; alt., alternate or alternately; wl., wool; inc., increase or increasing; dec., decrease or decreasing; st.st., stocking stitch; rep., repeat.

The Back

Using No. 12 needles, cast on 80 st. Work in k. 1, p. 1 rib for 2in. Change to No. 10 needles and work in st.st. until back measures 8½in., finishing after a p. row.

Shaping the Armholes

Cast off 3 st. at beg. of next 2 rows. Dec. each end of needle every row until 64 st. rem. Cont. straight until armholes measure 4in. deep.

Shaping the Shoulders

Cast off 6 st. at beg. of next 6 rows. Cast off rem. st.

The Front

Work exactly as for the back until the front measures 8½in., ending on a p. row.

Next row: Cast off 3 (counting st. left on right-hand needle after casting off), k. 34, turn; leave rem. 43 st. on spare needle. Cont. on 34 st., dec. 1 st. at armhole edge on every row until 28 st. rem. * Cont. straight until the work measures 11½in., ending at opening edge.

Shaping the Neck

Cast off 2 st., finish row. Dec. 1 st. at opening edge on every row until 18 st. rem. Work 4 rows straight.

Shaping the Shoulder

Cast off 6 st. from armhole edge on alt. rows 3 times. Fasten off *.

Return to stitches on spare needle, leave centre 6 st. on safety-pin, join wl. to rem. 37 st., k. to end of row.

Next row: Cast off 3 st., p. to end of row. Dec. armhole edge every row until 28 st. rem. Rep. from * to * for first side.

The Underwrap

Slip the 6 st. from the safety-pin on to a No. 12 needle, work in plain knitting thus:—

1st row: (K. twice into next st., k. 1) 3 times (9 st.). Work in plain knitting for 2¾in. Cast off.

Buttonholes and Front Border

With No. 12 needles cast on 9 st., and k. 2 rows.

Next row: K. 3, cast off 3, k. to end.

Next row: K. 3, cast on 3, k. 3 *. Work ¾in. in plain knitting, then make another buttonhole in next 2 rows. Rep. from * once, then k. 4 rows. Dec. each end of next row and every alt. row until 3 st. rem. K. 3 tog. Fasten off.

The Sleeves

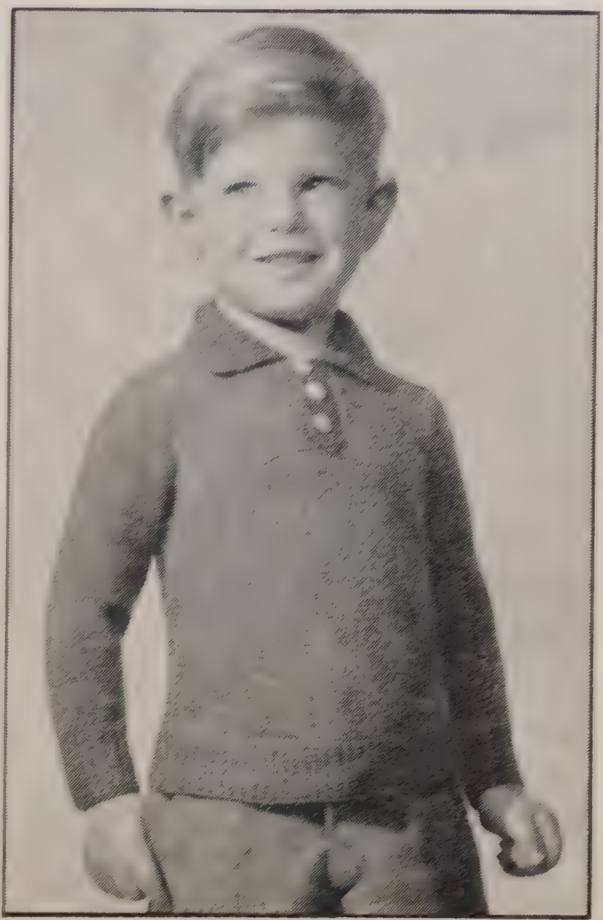
Using No. 12 needles, cast on 38 st. Work in k. 1, p. 1 for 2in.

Next row: K. 2, * inc. once in next st., k. 2, rep. from * to end of row (50 st.). Change to No. 10 needles. Cont. in st.st., inc. each end of needle on every following 8th row 4 times (58 st.). Cont. straight until sleeve measures 8½in. Cast off 1 st. at beg. of every row until 40 st. rem., then cast off 2 st. at beg. of every row until 20 st. rem. Cast off.

The Collar

Using No. 10 needles, cast on 16 st. K. 6 rows **.

7th row: K. 13, turn.



8th row: K., work 8 rows **. Rep. from ** to ** 12 times, then 7th and 8th rows once. K. 7 rows. Cast off.

The Make-up

Join the side, shoulder, and sleeve seams. Sew in the sleeves. Sew on the front borders. Sew on the collar and buttons.

FOR 2 TO 4 YEARS

Materials: 3½oz. of 3-ply knitting wool. One pair each of Nos. 10 and 12 knitting needles and 3 buttons.

Measurements: Length, 14in.; chest, 23in.; sleeve seam, 10in.

Tension: Same as for the first size.

The Back

Using No. 12 needles, cast on 88 st. Work exactly the same as for the first size until the back measures 9¾in. from beg., finishing on a p. row.

Shaping the Armholes

Cast off 3 st. at beg. of next 2 rows. Dec. each end of needle every row until 68 st. rem. Cont. straight until armholes are 4½in. deep.

Shaping the Shoulders

Cast off 7 st. at beg. of next 4 rows. Cast off 6 at beg. of following 2 rows. Cast off rem. stitches.

The Front

Work exactly as for the back until the work measures 9¾in., ending on a p. row.

Next row: Cast off 4 st. (counting st. left on needle after casting off), k. 37, turn; leave rem. 47 on spare needle. Cont. on 37 st., dec. 1 st. at armhole edge on every row until 30 rem. ** Cont. straight until the work measures 12¾in., ending at opening edge.

Shaping the Neck

Cast off 2 st., and finish row. Dec. at opening edge on every alt. row until 20 st. rem.

Shaping the Shoulder

Next row: Cast off 7, work to end.

Next row: Work to end. Rep. last 2 rows once. Cast off rem. stitches **. Return to stitches on spare needle, leave centre 6 st. on safety-pin, join wl. to rem. 41 st., and k. to end of row.

Next row: Cast off 4 st. and p. to end of row. Dec. at armhole edge on every row until 30 st. rem. Rep. from ** to ** for first size.

The Underwrap

Work as for the first size.

Buttonholes and Front Border

Work as for the first size, but k. 1in. of plain knitting between each buttonhole instead of ¾in.

The Sleeves

Work as for the first size, but inc. to 62 st. instead of 58, and cont. in st.st. until sleeve measures 10in. from beg. Then cast off 1 st. at beg. of every row until 42 st. rem., then cast off 2 st. at beg. of every row until 22 st. rem. Cast off.

The Collar

Cast on 18 st. on No. 10 needles. K. 6 rows **.

7th row: K. 15, turn.

8th row: K. Work 8 rows plain **. Rep. from ** to ** 12 times, then 7th and 8th rows once. K. 7 rows.

Cast off, and make up as for the smaller jersey.

◆

United Nations Appeal for Children

THE 1952 United Nations Appeal for Children is being made in New Zealand from 14 September to 31 October. This year's target will be £230,000, which was the amount subscribed by New Zealanders in the 1950 appeal, when the Dominion contributed the second highest amount.

Money collected will be spent in New Zealand on food and medical supplies which will be distributed to the world's needy children by the United Nations International Children's Emergency Fund. UNICEF gives aid only after a careful survey has been made of the circumstances and on condition that the country concerned provides an equal amount of goods or services. This means that every pound subscribed to the fund will be doubled.

◆

SUPPER SNACKS

HORS D'OEUVRE PLATTER

THE hostess intending to entertain guests usually looks ahead and prepares an interesting supper. Whether the evening has been devoted to music, literature, or sport, appetising snacks are always appreciated and have the advantage that often they can be prepared beforehand, leaving the hostess free to take her part in the evening's festivities. The preparation of some such foods is described in this article by Nell Macpherson, Field Officer in Rural Sociology, Department of Agriculture, Auckland.

HORS D'OEUVRES, which more often are served before a meal to tempt the appetite, can be used very satisfactorily at suppertime as small savoury titbits. A tray or platter can be used as a centrepiece, or the hors d'oeuvres may be mounted on toothpicks stuck into a choko or brightly polished apple.

For an hors d'oeuvre platter divide the area of a dinner plate or an oval meat dish into six or eight approximately equal sections with spring onions or celery sticks and fill each section with a savoury food such as cubes of cheese, sardines, pickled onions, wedges of stuffing, cucumber, radishes, slices of cooked sausage, cubes of beet, pineapple, olives, or capers.

If the hors d'oeuvres are to be mounted on toothpicks, it is sometimes more attractive to put two or three varieties of food on each.

Canapes

Small shapes of toasted or fried bread covered with a savoury mixture are called canapes, The bread should be cut about the same thickness as for toast. The savoury mixture can be spread on water crackers or similar biscuits if preferred.

Bacon and cheese canapes: Butter slices of stale bread and spread them with grated cheese softened with Worcestershire sauce. Cut each slice into four and lay a strip of bacon along each finger of bread. Place them on an oven slide and put them into a hot oven. By the time the cheese has melted and the bacon has crisped (about 10 minutes) the bread will be toasted on the under side.

Sausage and chutney canapes: Slice stale bread rather thinly, cut off the crusts, and cut the slices into four. On each section put a dab of chutney and a slice of cooked sausage. Brown them in the oven for about 10 minutes. These may be served hot or cold.

Egg and onion canapes: Scramble an egg in a tablespoon of milk and add two chopped spring onions. Spread the mixture on strips or squares of fried bread.

Savoury Boats

Wash celery sticks, remove the strings, and cut them into 2 or 3in. lengths. Fill each length with a savoury mixture, moulding it up a little. Put a quarter section of a slice of lemon, radish, or carrot on each "boat" for a "sail".

Suitable fillings are fish mashed in white sauce; grated cheese softened with Worcestershire or tomato sauce; mashed hard-boiled egg and chives; chopped apple and mayonnaise; and cucumber pulp and mayonnaise.

Savoury Mixtures

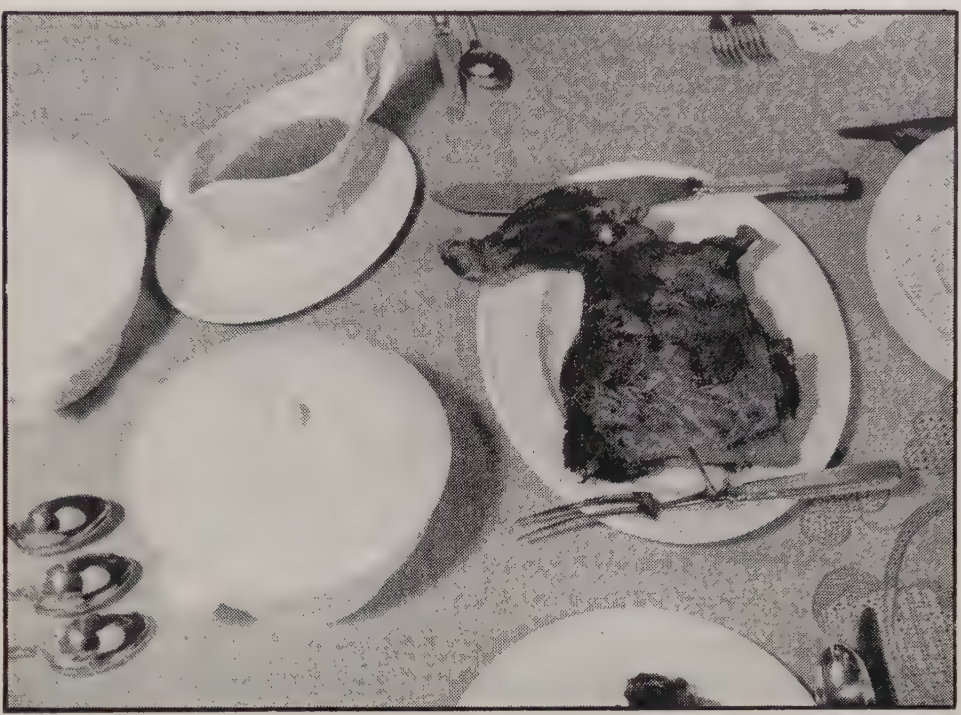
Some savoury mixtures which can be spread on biscuits or pieces of toast and served cold are minced ham and horse-radish sauce; chopped celery and mayonnaise; cheese and chopped raisins; chopped walnuts, mayonnaise, and vegetable extract; chopped mushrooms and white sauce; and onions and mashed asparagus.

Photograph by Sparrow Industrial Pictures.

☆

Selection and Care of China

BUYING china for the home is always interesting, as china is an integral part of the furnishings. Suitably chosen dishes add a decorative note to the table, and there is a sufficient range of patterns available to harmonise with every colour and style of interior decoration. There are various kinds of china in use in the home, but in this article by Nell Macpherson, Field Officer in Rural Sociology, Department of Agriculture, Auckland, tableware only will be discussed.



Fine, white earthenware dinner set.

SELECTION of china should be based on the various types of ware available, which have different characteristics and thus different uses, such as simple pottery, earthenware, and china or porcelain. All these types of ware are made from a mixture of clays with other substances, are fired in a kiln, and are then covered with a glaze, which is again fired in a kiln. The hardness of a dish depends on the degree of heat used in the firing of the clay mixture.

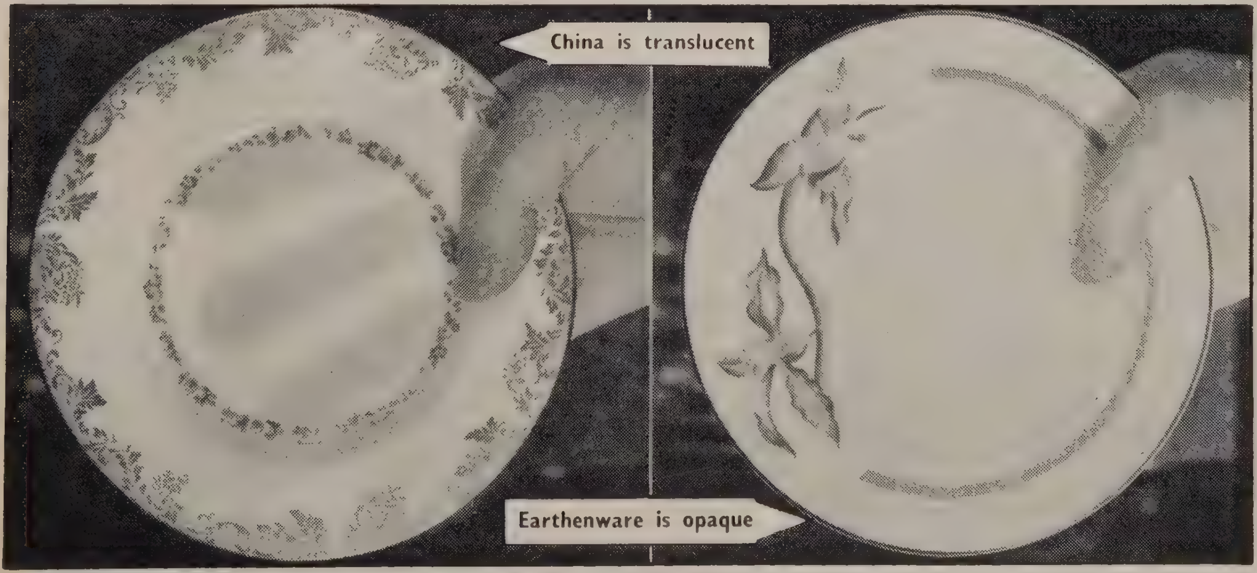
Pottery and coarse earthenware are fired at a lower temperature than fine earthenware and china. They are less hard, porous, and will absorb moisture. They are known as non-vitrified ware. Fine earthenware is fired at a higher temperature, is harder, and will withstand wear better than coarse earthenware, though it is still slightly porous. This is sometimes known as semi-vitreous ware. Fine earthenware is the type of ware most commonly used as tableware. Its colour is attractive and it is reasonably priced.

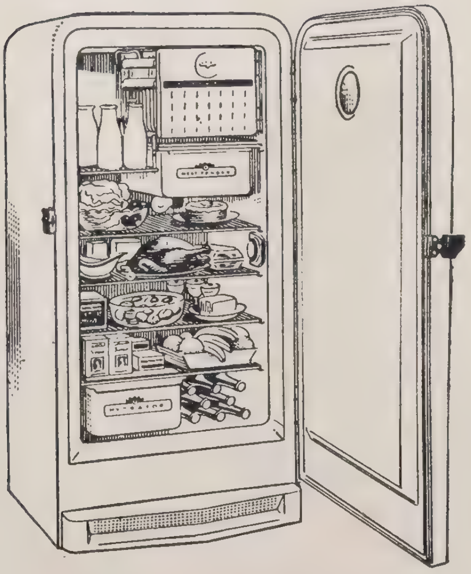
China

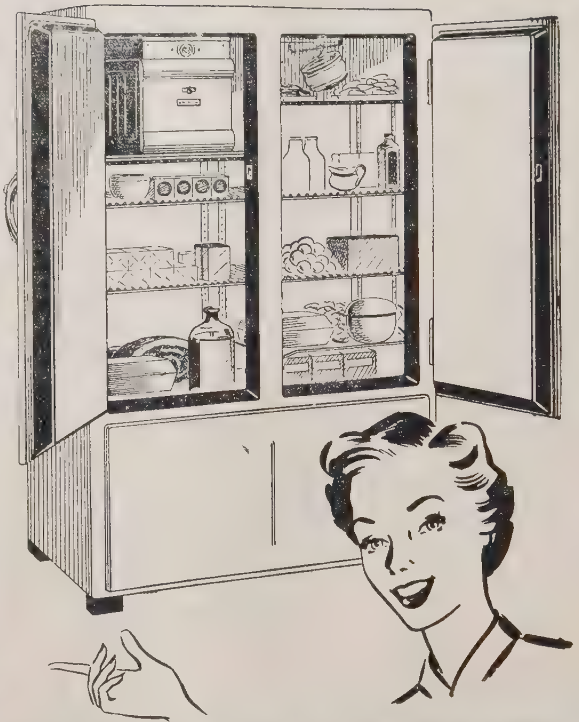
China is used in teasets and fine cups and tableware, but because of its cost it is less suitable for tableware in constant use. China is fired at a higher temperature than fine earthenware. It is made from a combination of clays and sometimes bone ash is added. This explains the name bone china. China originally got its name because all fine, translucent porcelain known to Europe was imported from China until suitable clays were found in various parts of England and the Continent. China is hard, not porous, and translucent. It can always be distinguished from other ware, because if it is held up to the light the shape of an object behind it is seen through the china.

Glazing

All types of ware are glazed, as glazing makes them smoother to touch,







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easier to keep clean, and impervious to moisture. The type of glaze varies with the ware. When it is fired on the ware the surface should be covered. If a glaze is not properly chosen for the ware or is not correctly fired, fine cracks may form in the glaze when the ware is used. This crazing is a disadvantage in earthenware for table use, as the porous earthenware under the glaze will absorb moisture, stains, and food flavours and the article can become unsuitable for use.

Glaze is a decoration in itself, but other decorations may be added. Those added before the glaze are known as underglaze decorations; those added after the glaze has been fired are known as overglaze decorations. For household use underglaze decoration is generally more suitable, as the colours wear better. All-gold decoration is overglaze decoration, because the gold changes in colour in the heat of the glazing kiln.

Factors Influencing Cost

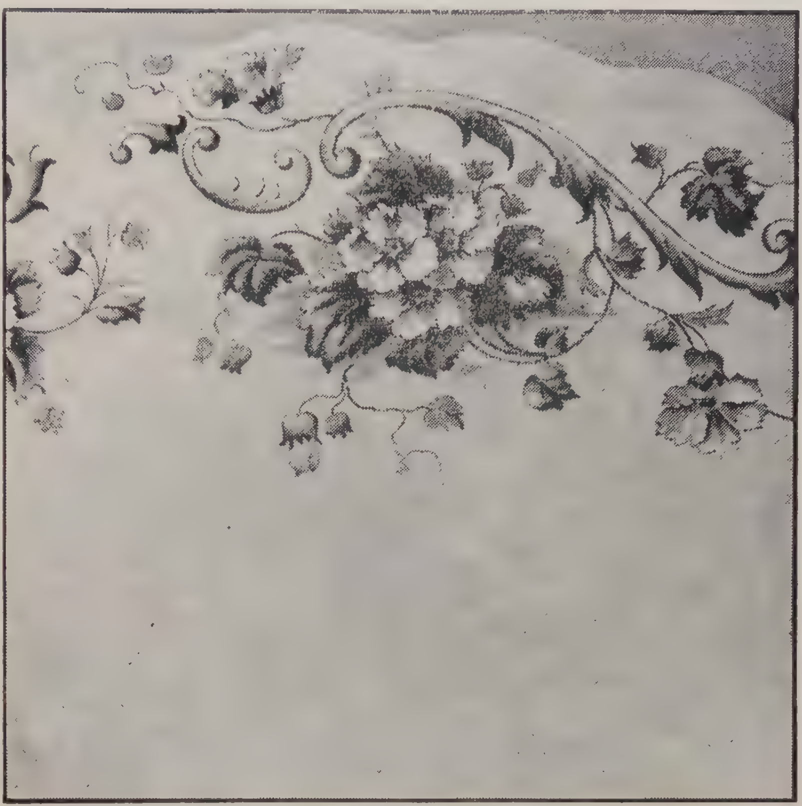
The cost of tableware depends on three main factors:—

1. The type of ware: Generally china is more expensive than fine earthenware, and fine earthenware is more expensive than coarse earthenware and pottery.

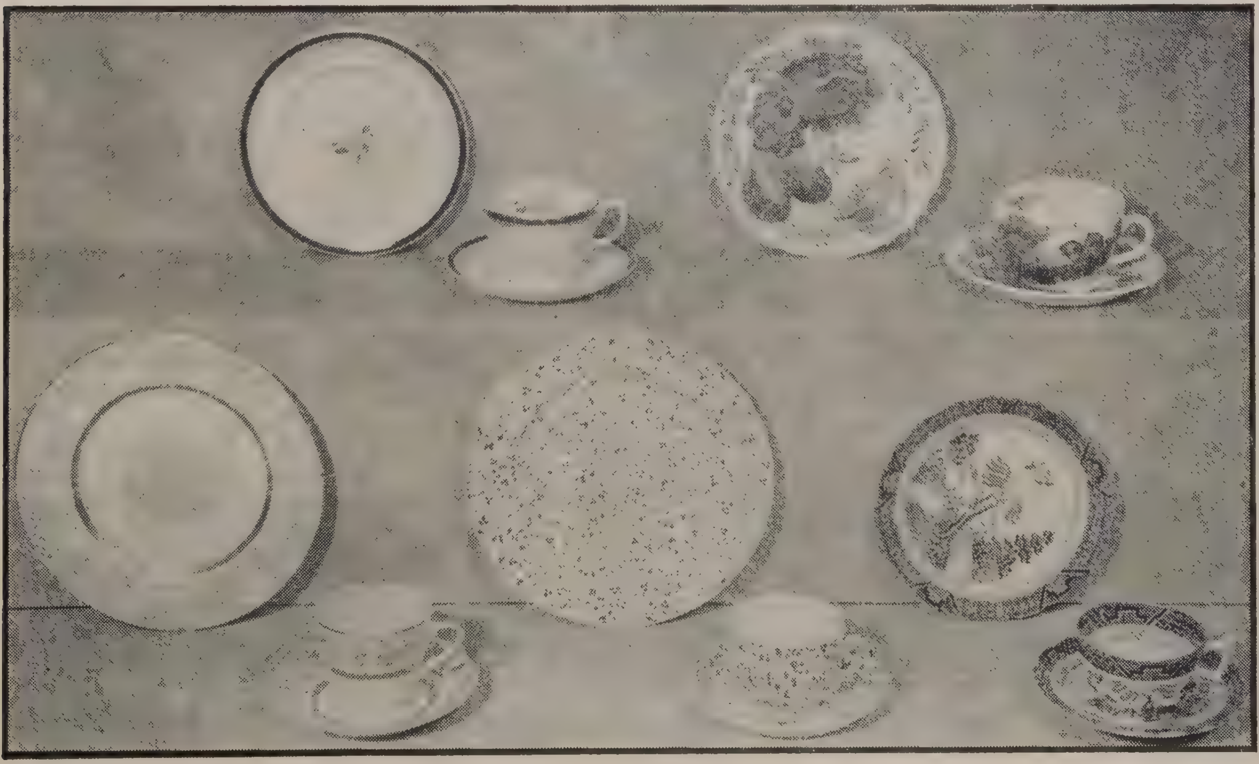
2. The cost of the decoration: A complex design is often more expensive than a simple design, because of the number of operations involved. In high-grade ware a minimum of decoration may enhance the cost, because there must be no minor blemishes in the body of the ware.

3. The strictness with which the manufacturer grades his ware.

There are many shapes and designs available in tableware, but there are



Above—Crazing of the glaze, which may be due to poor care. Below—Some stock patterns of china at present available.



some points which should be considered in buying china:—

Shape: The smoother and more regular the shape of plates the easier it is to clean them and keep them clean. Plates of smooth, regular shapes are also easier to stack in a cupboard and are less likely to be chipped. Cups should be of pleasing shape, but not too wide at the mouth, as liquids cool more rapidly in wide-mouthed cups. Jugs should be wide at the mouth for easy cleaning.

Handles: With vegetable dishes and lids knobbly and projecting handles are those most often broken, chipped, and cracked. This also applies to cup handles and gravy boat, teapot, and jug spouts and handles.

Pattern on the china: Raised patterns are also more likely to be chipped. One may tire of a vivid pattern after a time. If possible, a "stock" pattern should be bought. A stock pattern is one which the retail shops carry for some years, and this means that extra pieces or replacements are available. It is wise to ask how long a stock pattern has been carried by a particular shop, as very few patterns are kept in stock indefinitely.

Choice of Dinner Service

In many households a utility type of china is most useful as a dinner service. It should withstand wear well and yet replacements should not be too expensive. When single pieces are being replaced it is wise to give the over-all diameter of the plate, as there are different methods of measuring plates. The minimum of china needed for a home varies with the number of people in the house, but the standard 33-piece set is a good basis to work from.

Composition of Standard 33-piece Set

	No. of pieces
6 dinner plates	6
6 entree plates	6
6 tea plates	6
6 coupes (soup)	6
1 gravy boat and stand	2
2 vegetable dishes and lids	4
3 meat dishes or ashets	3
	33

Separate cups and saucers will have to be bought with this set.

If one is buying from a stock pattern and wishes to buy a minimum service for 6 people, it would be possible to buy the following 33 pieces and add the other pieces as desired. (This is not a standard set as sold in retail shops.)

6 entree plates
6 tea plates
6 coupes (soup)
6 cups
6 saucers
1 medium platter or ashet
1 vegetable dish and lid (2 pieces)

Possible later purchases are:—

6 dinner plates
1 small ashet
1 large ashet
1 gravy boat and stand
1 vegetable dish and lid (2 pieces)

Apart from this basic set the following articles will be required: 3 jugs (assorted sizes), 1 sugar basin, 2 or 3 jam dishes, and 2 or 3 butter dishes. These may match the china, but need not.

Harlequin Dinner Services

Recently it has become fashionable to buy harlequin dinner services. This is one way of solving the replacement problem. The services may be plain coloured, and either 2-place settings in each of three colours or 6-place settings each of a different colour may be bought. This practice can be followed with patterned china equally well, but the pattern on the various place settings should be related and the type of ware should be the same; for example, 2-place settings in each of three floral patterns, or 2-place settings in each of three colours with the same floral or conventional pattern.

Storage of China

China is often damaged in poorly spaced cupboards or cabinets because of the need for stacking dishes one on the other. Flat dishes or coupes which are similar in size and shape can be stacked in piles, but only one size should be in each pile, as the shuffling of different sizes and shapes causes chipping and cracking. Cups should never be stacked on each other, as this leads to cracking of handles and chipping of edges. They are better hung on hooks or stored upside down in rows on narrow shelves.

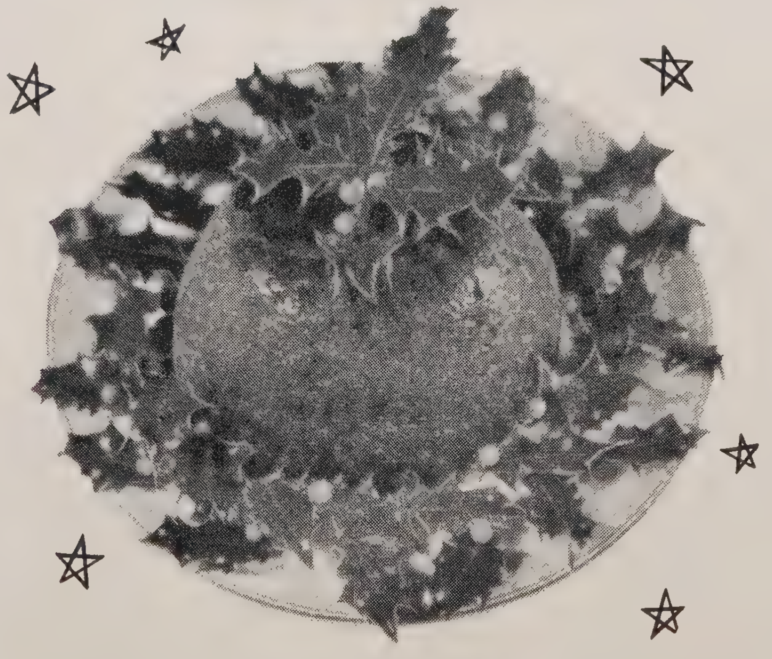
Warming and Washing

Dishes may be warmed gradually in the oven, but they should not be put into a hot oven or left in a hot oven, as this can cause crazing of the glaze. Rinsing a few plates in hot water is the quickest way of warming them. Sudden changes in temperature should be avoided, as this can cause cracking.

Stacking dishes before washing them should be carefully done, as careless piling can cause cracking, scratching, and chipping. All the dishes from a meal should not be stacked in the sink together, but should be washed separately to prevent damage.

Tempering

Both china and earthenware can be tempered. Place the dishes in a preserving pan with a folded cloth on the bottom and cover them with water. Heat the water to boiling and then allow the contents to cool slowly in the water. After this treatment articles are less liable to crack when hot food or liquids are placed on them.



Christmas Pudding

To relieve the rush of work at Christmas many housewives make puddings some weeks before. This recipe will give a pudding with the popular flavour and appearance:—

4oz. of flour
4oz. of breadcrumbs
3oz. of suet or cooking fat
12oz. of mixed dried fruit
3oz. of sugar
1oz. of golden syrup
1 teaspoon of marmalade
2 eggs
¼ level teaspoon of salt
1 level teaspoon of mixed spice
¼ teaspoon of ground ginger
½ nutmeg grated
2 tablespoons of brandy
½ gill of stout
Essences to taste
A little milk if needed

Wash and dry the fruit. Mix flour, breadcrumbs, and salt in a bowl and add suet, finely chopped, or rub in the cooking fat lightly, if this is being used. Add the sugar, fruit, and spices, then the eggs, and mix thoroughly. Add the golden syrup and marmalade, essences, brandy and, if needed, enough milk to give a soft dropping consistency. Put into a greased pudding basin (2-pint size) or two smaller ones, cover with greased paper, then with a pudding cloth, and steam for 5 to 6 hours. Steam again for 1½ hours before serving.

A Honeycomb Nightdress

A VERY simple but attractive nightdress can be made from two straight pieces of material. The bodice is embroidered with honeycombing, a form of smocking that is very easy to do, and this stitching draws in the bodice to fit neatly, though providing sufficient elasticity to suit most figures. Details of the amount of material needed for various sizes and a description of the embroidery stitch and the steps necessary for making up the nightdress are given here by Helen Paine, Field Officer in Rural Sociology, Department of Agriculture, Wellington.

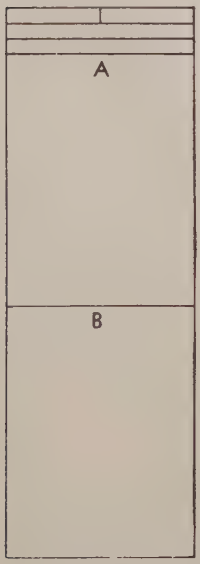
A HONEYCOMB nightdress could be made of any of the usual lingerie materials, silk, crepe de chine, georgette, or fine voile, but it is particularly attractive when made of nylon. Honeycombing, like smocking, becomes flattened and loses its prettiness after repeated washing and ironing, but as a nylon fabric does not need to be ironed, the embroidery looks fresh and attractive as long as the garment lasts.

Materials Needed

The amount of material needed for the nightdress depends on the height of the person who is to wear it; 3yds. is sufficient for anybody up to 5ft. 3in., but 3¼yds. will be necessary for a taller person. The straps and sash are cut out of this amount of material. Stranded cotton or mercerised pearl cotton is needed for the embroidery, which should be all in one colour. If the nightdress material is a pastel colour or figured, the honeycombing is very pretty if done in white thread.

Cutting the Material

Three strips of material each 3in. wide are cut across the whole width; two are for the sash and the other is divided in two for the straps. The remaining material is then cut in halves. These two big pieces form the back and front of the nightdress. Care should be taken to see that each strip is cut exactly on the grain of the material. If possible, a thread should be pulled out across the fabric as a guide for cutting. This is very easy if the material used is nylon, because the individual fibres are particularly strong and can be pulled out easily.



Method of cutting the material. A—Cut off three 3in. strips; cut one strip in halves. B—Divide the rest of the material into two pieces.

Planning the Honeycombing

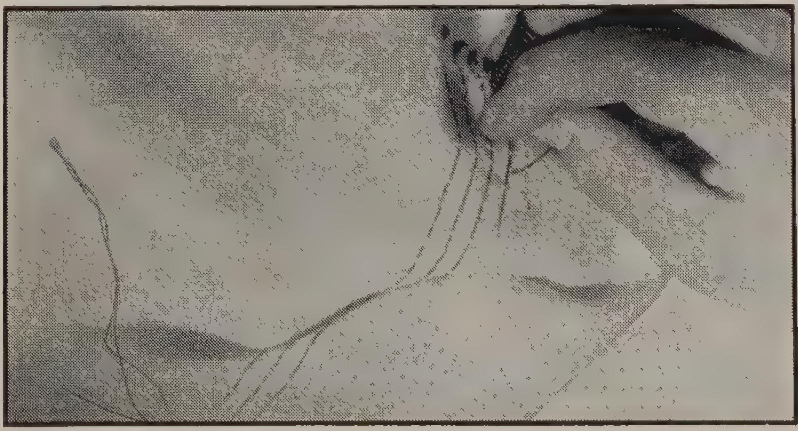
The honeycomb stitch, like smocking, is worked by gathering the material into small pleats and embroidering it in this position. The material is stamped with smocking dots, which should be from ½in. to ¾in. apart for this stitch. The fabric used in the nightgown illustrated was striped, and threads were drawn across the width of the material at the same intervals as the stripes. It was not necessary, therefore, to transfer smocking dots, as the intervals were adequately marked where the stripes and the drawn-thread lines crossed.

Three times the required width of smocking should be allowed in flat material. As most lingerie materials are 36in. wide and about 16in. is required for the finished bodice, 3in. should be left plain on either side of the honeycombing, which will reduce the 30in. allowed to 10in. The 10in. of honeycombing with a 3in. border on either side gives a total measurement of 16in., which, with a back of the same width, gives sufficient material to stretch to fit any bust measurement up to 36in. For larger sizes 4in. to 4½in. of material should be left at the edges. These measurements are only approximate. As they depend on the tension of the embroidery to some extent, and as the finished effect is very elastic, approximate measurements should be satisfactory.

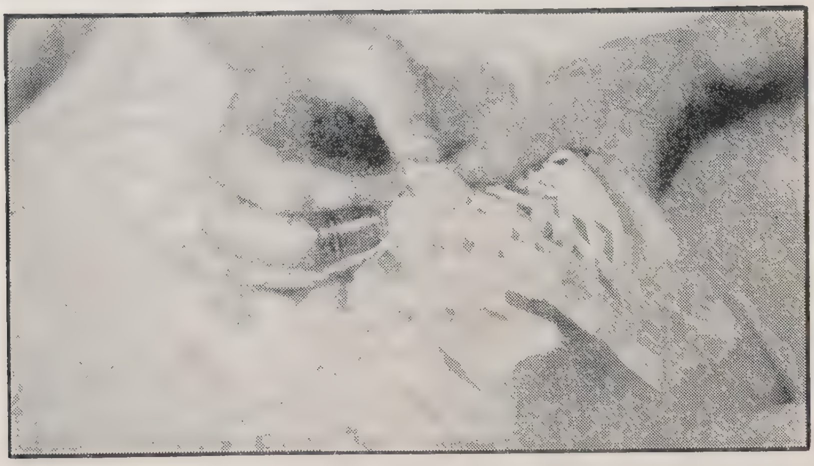
The dots are next transferred to the width of the material calculated from within 2in. of the upper edge down to the waist 10in. below the beginning of the dots. This distance is sufficient for smaller sizes; 12in. is necessary for larger sizes. This piece will form the front; the back is honeycombed for only 7in. for the smaller sizes and 9in. for the larger.

The Honeycombing

When smocking is done it is essential to gather up the material evenly. A thread longer than the width of the material to be gathered is knotted. The work is done from right to left with a running stitch and each dot is



Picking up the dots for honeycombing.



Honeycombing without picking up the dots.

caught up by a short stitch, as shown in the illustration on page 357. Each row of dots is caught by a similar running stitch; then all the threads are caught up together and gathered evenly. The threads are then knotted together in pairs. The beginner is wise to prepare the ground in the way described, but it is possible for anybody with a little smocking experience to do this stitch without first drawing the material up into gathers. The embroidery looks the same with either method, both of which are described here.

With Preliminary Gathering

With the material already gathered into fine pleats the embroidery is done on the correct side of the material and worked from left to right. The work is done in rows, two rows being worked together.

Start at the top left-hand side and take a stitch through the first two pleats, bringing the needle out just below the position where it was inserted. Take another stitch in the same position slightly below the first, but this time bring the needle up in the row below by sliding it down the second pleat on the wrong side. In the second row a stitch is taken through the second and third pleats. Another stitch is made in the same position and the needle is carried up at the back of the third pleat to the top row, where the third and fourth pleats are caught. Continue this stitch, zig-zagging from the top to the second row until the end of the dots.

Start at the left again, working the third and fourth rows of dots in exactly the same way as the first and second. The stitches will then form a diamond pattern. The stitch is continued until all the rows are caught; then the gathering threads are removed.

Without Preliminary Gathering

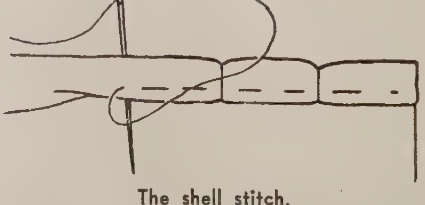
To honeycomb without first gathering the material in pleats the embroidery is worked on the right side of the material from left to right. The embroidery thread is attached at the top left-hand dot. A stitch is taken, catching the second dot and drawing it toward the first. When the thread is tightly pulled and the two dots are close together a second stitch secures the dots in position. A third stitch is taken into the second dot, and as before the needle is carried across the back of the material down to the second row of dots. A second set of stitches is taken, connecting the second and third dots in the second row. The needle is then carried up to the top row, where the third and fourth dots are drawn together. The row is completed; then the third and fourth rows are stitched in exactly the same way as the first two, as are the other pairs of rows. The effect achieved is the same as that for embroidery done with preliminary gathering, and with a little practice can be just as even and attractive.

Making up the Nightdress

First hem the two widths of material cut for the sash. This can be done in shell stitch as described later for the neck edging. The front and back pieces of the nightgown are then tacked together, the sash being incorporated in the seam. With most materials it is possible to use the selvedge and sew a plain seam. With materials that need to have the selvedge cut off because of shrinkage, a french seam should be used and the sash incorporated in the second line of stitching. The sash is placed so that its bottom edge corresponds with the bottom of the honeycombing on the front bodice. The sash is tacked into place on the front piece of material, with the two right sides facing each other. Do this on both sides, then tack the front and back pieces of the nightdress together and sew. Hem the top and bottom of the nightdress, cut the straps to the right length, hem them, and attach them to the top edge of the nightgown.

Shell Stitch

An attractive stitch for hemming the sash and straps and any raw edges of the nightdress is the shell stitch. A hem about ⅛in. wide is turned over in the hand while the work progresses. Make small running stitches to catch the hem; then take a stitch right over the hem, bringing the needle up in the loop of the thread. Take three more running stitches and repeat the overstitch along the length to be hemmed.



The shell stitch.

If the top of the nightdress is hemmed with this stitch, there is no need for any other trimming, as the honeycombing draws in the lower part of the bodice and the top edge frills out to form a most attractive edging

Stuffed Sausage Apples

DESIGNED to serve 4 people the recipe for stuffed sausage apples is 4 medium-sized cooking apples, ½lb. of cooked sausage meat, 4 rounds of stale bread, and watercress.

Mince the sausage meat. Scoop out the centres of the apples with a sharp, pointed knife leaving a thick shell; cut off all the apple pulp from the core. Chop finely and mix with the minced sausage meat. Fill the centre of each apple with the mixture, piling it up high. Stand them on a baking-tin which has a little water in it, and bake in a moderately hot oven until the apples are soft, basting occasionally with a little of the water in the tin. Serve on rounds of fried bread and garnish with watercress.

Merry
Merry Christmas
Mummy
Tommy
Jane
Alan

Christmas Cards

CHRISTMAS CARDS were first used about the middle of last century and the giving of them is now a charming custom, the sending of greetings cards of all types having become much more common. Many kinds of Christmas cards can be bought, but if time can be spared for the making of them, such cards are more acceptable than even the most carefully selected bought ones because of the thought and care that have gone into their making. In this article are described several methods of making attractive Christmas cards.

By

NELL MACPHERSON,

Field Officer in Rural Sociology,

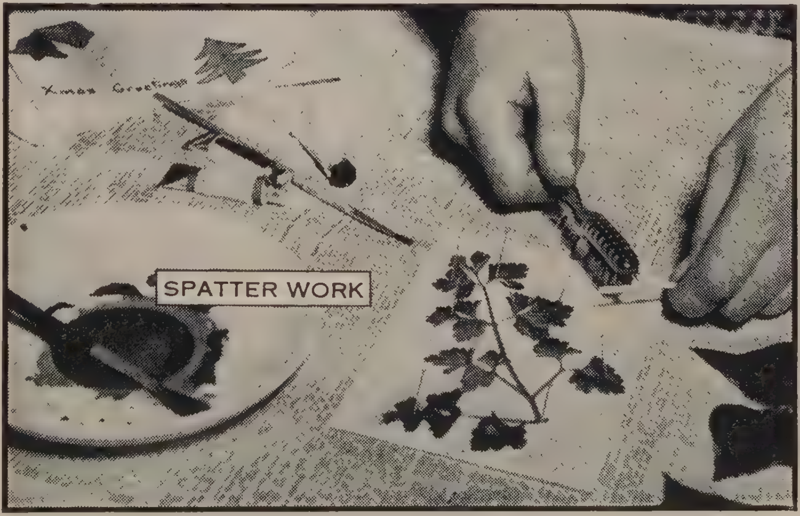
Department of Agriculture, Auckland

BEFORE STARTING to make cards it is wise to find out the sizes of envelopes readily available from stationers. Some fairly common sizes are 5¾in. x 4¾in., 5¾in. x 3½in., 5½in. x 3¼in., 4¾in. x 3¾in., and 4¼in. x 3¼in. The cards should be slightly smaller than the envelopes to allow their easy insertion. If a large number of cards is to be made, a variety of shapes is desirable. Unused envelopes can be used for correspondence during the year.

The cards can be decorated in several ways. The simplest is to sketch scenes or figures on the cards and then paint them with water colours. Not everyone has that talent, but charming cards can be made from ordinary drawing paper in one of the following ways.

Spatter Work

The equipment necessary for spatter work is an old toothbrush, a match or toothpick, a saucer, a selection of water paints, some leaves or other suitable shapes, and pins.



SPATTER WORK

Cover the working surface with old newspaper and spread the drawing paper out to a suitable size for a card on it. Arrange the leaves on the card and pin them flat if they tend to curl. Mix water paint to a creamy consistency on the saucer. Dip the toothbrush in the paint, shake it to prevent large drops falling on the card, hold the toothbrush over the card bristles downward, and draw the match backward and forward across it. Continue to do this until the card is fairly dark.

Put the card aside to dry and then remove the leaves. The message can be written inside the card.

GLITTER WORK

Glitter Work

Glitter is obtainable in four or five colours.

Draw shapes or paint words in glue on the card, sprinkle a pinch of glitter over the glue, and leave it to dry. The glue should be fairly wet.

Stencils

Thin cardboard (the back of an old writing tablet is excellent), a sharp-pointed knife, a board, and a pencil are all the equipment needed for the making of simple stencils.

Draw shapes on the cardboard, Christmas trees, bells, jars, candles, and holly leaves being easy ones. With the sharp point of the knife cut along the lines. Lift out the shapes and the stencils are ready for use. The cut-out shapes can be used in making spatter-work cards.

STENCILS

Xmas
Greetings and Best Wishes for the New Year

Place the stencil over the drawing paper and paint the shapes through the holes. Combinations of colours can be used to give a prettier effect. Lift the stencil off carefully to avoid blurring the outline. If it should be blurred, straighten it with a few strokes of the brush.

Cut-outs or Silhouettes

Coloured paper, glue, and scissors are necessary for the making of cut-outs.

Draw the shapes (from stencils if suitable ones are available), cut them out, and paste them to drawing paper. A frame may be drawn round the edge of the card in paint.

For a different type of cut-out the card is cut in the shape of a scroll, for example, and has the message printed on it.

Still another type may be made by cutting out a picture or a cartoon, mounting it inside the card, and cutting out an attractive shape from the outside so that the picture can be seen.

Traced Designs

Many embroidery designs are suitable for Christmas cards. They can be traced on to the card through carbon paper. Do not press too heavily, as water paints will not always take over heavy carbon, though they cover light carbon readily. The traced design can be painted to match the colour guide given for the embroidery.

Any two of the methods given can be combined to make an interesting card which is unlikely to be duplicated and which has a truly personal touch.

Raising Bedding Plants in Flower Garden

THE growing of annuals and other bedding plants in the home garden for use in flower borders is an extremely interesting phase of gardening. It costs little and is so simple that every home gardener should be able to provide himself with all the necessary bedding plants for the season's displays. In this article C. K. Ellis, formerly Horticulturist, Department of Agriculture, Dunedin, discusses the raising of bedding plants.

THERE are many hardy annuals the seed of which may be sown directly into the positions where the plants are to grow and flower and which are not difficult even for the beginner in gardening to handle. However, the tender and half-hardy annuals are normally sown in boxes and pans or in pots and are given the protection of the greenhouse, a cold frame, or a sheltering wall to bring them through the earliest stages of their lives.

Cleanliness

The importance of sterilising soils to be used for seed sowing should never be overlooked. The methods of soil sterilisation used at present to obtain clean soil for seed sowing are briefly as follows.—

Formalin used at the rate of 1 gallon to 40 gallons of water for each 10 sq. yds. of soil surface is reasonably effective. After application of the liquid, the surface should be covered with sacks for a week, and after removal of the sacks, allowed to air for a fortnight before being used.

Chloropicrin (tear gas) is very satisfactory, but few home gardeners possess the injector necessary for the application of this compound to the soil.

Low-pressure steam sterilisation can be carried out as follows:—

Inset in a copper or other convenient type of boiler a sheet of iron perforated with small holes or a framework of crossed wooden slats the interstices of which should not be larger than 2in. or 3in., leaving sufficient clear space in the bottom for 2 or 3 gallons of water. If perforated iron is used, the soil may be placed immediately on top of it, but should be heaped up toward the centre so that there is not a great amount of soil touching the sides, where it may become scorched or burnt. If a wooden framework is used, the soil should be placed first in open-weave bags or sacks and placed in turn on top of the framework, care being taken to see that the sacks are free from the sides of the copper. The water should be boiled until the temperature of the soil has risen to about 190 degrees F. and been maintained there for approximately 20 minutes.

It is not sufficient that the soil alone should be clean, for it is a waste of effort to put clean soil into dirty containers. New boxes should be painted first with some type of wood preservative, other than creosote, to prolong the life of the box and discourage fungi. Old boxes, pots, and pans should be cleaned thoroughly and washed free from mosses, algae, and fungi. These used materials can be sterilised partially by spraying with 4 per cent. formalin. Such precautionary steps are a necessary and vital part of the raising of bedding plants.

[*Douglas Elliott photo.*

French marigolds as a border in front of ageratum.

Soil

New Zealand garden soils vary so greatly that it is difficult to recommend a simple standard mixture which will give adequate results throughout the Dominion, but no mixture could better meet such a situation than that recommended by the John Innes Institute for the sowing of seeds and pricking out and which is detailed below.

The mixture consists of 2 parts by bulk of sterilised medium loam, 1 part by bulk of leaf mould or good pulverised composted garden refuse, and 1 part of coarse sand. These constituents should be passed through a ⅜in. sieve and thoroughly mixed, and to the mixture should be added 1½oz. of basic superphosphate and ¾oz. of carbonate of lime to each bushel of the compost. (A bushel of soil is equal approximately to the amount that can be held in a standard size apple case.)

All constituents of this compost should be mixed intimately. The best method is to spread the loam evenly on the floor, spreading the leaf mould or compost on top of it and finally above that the sand, with which the lime and superphosphate may be mixed for convenience. Mixing may be done with a shovel strip by strip and as the soil is turned it should be spread in an even layer and the operation repeated three times.

This soil mixture can be considered ready for use only when it has the correct water content, and that can be judged by taking a handful of the soil and compressing it slightly in the clenched fist. When the fist is opened the compost should more or less retain its shape in the ball with perhaps a crack or two in it and should leave no moisture or sticky muddiness on the

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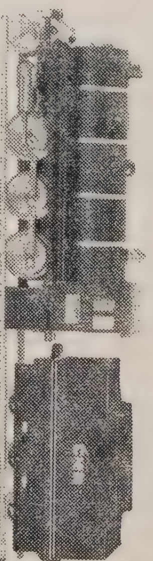

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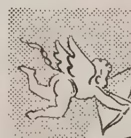

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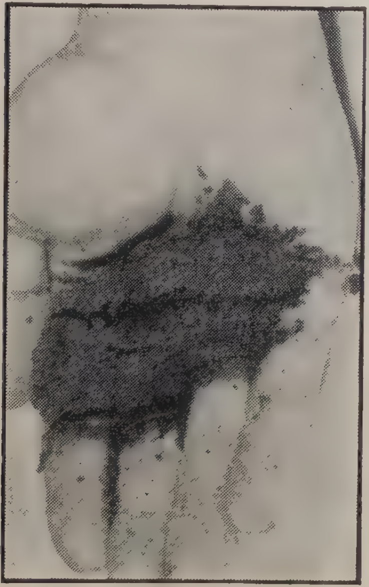
fingers. Should the soil crumble on release of the grip, it is too dry and if it remains in a sticky mass with moisture left on the fingers, it is too wet.

The mixture must be in the correct condition before use. It is useless to sow the seeds and endeavour to correct the condition later.

Preparing the Boxes

The boxes to be used should not be more than 4in. deep—a greater depth of soil is not necessary—and should have the boards on the bottom spaced out a bit from each other to allow free drainage of water.

A layer about ½in. thick of any organic material, such as spent hops, cocoa husks, or flax fibre, will assist drainage. The box should be loosely filled with the compost until it reaches above the level of the sides, and reduced again to the level of the sides by striking off the surplus with a board. The soil should be pressed down firmly at the edges and at the corners, using the fingers or a rammer, to ensure that rapid drying out does not occur near the outsides of the boxes and that the application of water does not cause depressions at the corners. The rest of the soil should now be firmed down with a piece of wood so that the entire surface is perfectly level when the job is completed. If the surface is not levelled, water applied to the boxes after germination of the seedlings will run into the lower areas, giving uneven watering, and sometimes seed will be washed into these small depressions. Uneven watering will naturally greatly affect germination and subsequent growth of the plants. The levelled soil surface should be approximately ½in. below the edges of the box to allow room for covering the seeds after sowing and for air under the glass which will later be placed on top of it.



[*Photo News Ltd. photo.*

Soil in the correct condition for use in seed boxes or pots should look like this when the hand is opened after compressing it slightly.

[*Photo News Ltd. photo.*

Press compost firm at the sides and corners of the box by jabbing the fingers into it at close intervals.

Should pans or pots be used, drainage is especially important. These should be well crocked with a large crock concave side down covering the drainage hole and with several smaller crocks over and around it. A thin layer of fibrous material should be placed on top of these crocks to prevent the soil being washed down between them and hindering drainage and also to prevent slumping of the soil surface. These pots and pans are filled with compost in the same manner as the boxes. At this stage the receptacles should be thoroughly watered except where very large or heavy seeds are to be used, when watering may be done after sowing.

Sowing the Seeds

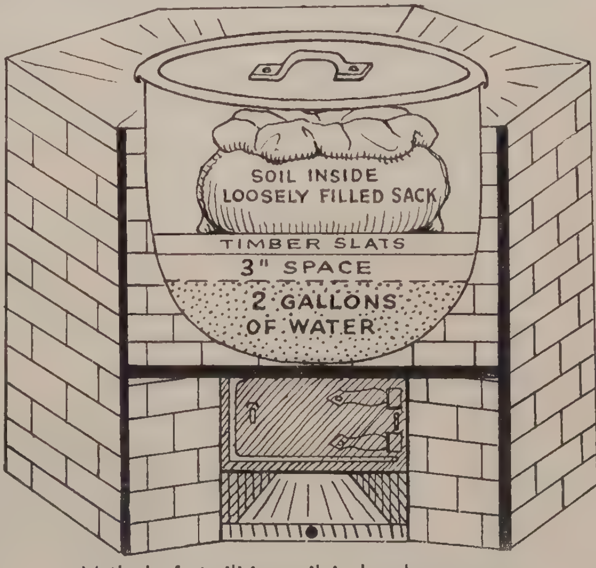
It should always be assumed that the germination of flower seeds will be good and accordingly seed should be sown thinly. It is a bad practice to assume that germination will be poor and to sow thickly, for if germination happens to be good, the seedlings will be left with insufficient room for proper healthy development. Seed sowing may be done in a variety of ways; more experienced growers prefer usually to sow directly from the seed packet. The home gardener may use this method or may sow the seed pinch by pinch or even shake it over the boxes with a salt or pepper shaker.

Even distribution of the seed is essential and where large seeds are being sown it is not a waste of time to sow them one by one in some sort of geometrical pattern. The disease of seedlings known as "damping off" is less likely to spread in well-spaced seedlings.

It is usual to sow only one variety in each receptacle, but where small numbers of plants are required boxes may be divided into strips by placing bamboo canes across the surface or by inserting in the soil strips of glass or wood which just reach across the boxes, thus reducing the possibility of mixing the seed after watering. As an alternative small drills can be made across the boxes with a stick or with a finger and the separate varieties sown in them. Each variety should be carefully labelled at this stage.

Covering the Seedlings

A ⅛in.-mesh sieve should be used to spread a very light covering of soil over the seed. A finer sieve than this should not be used, for the finely divided soil which is passed through it is very apt to cake and crack after watering. The covering for the different types of seed varies with the size of the seeds sown. Normally, a covering which is in depth equal to about three times the diameter of the seeds is satisfactory.



Method of sterilising soil in laundry copper.

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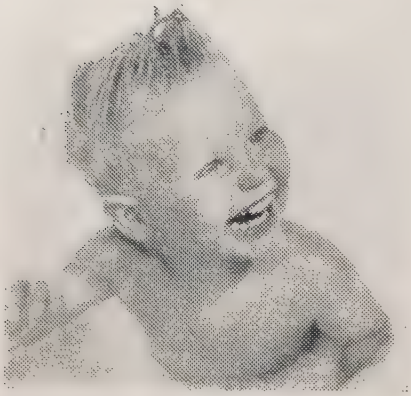

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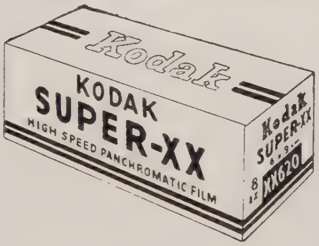

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It is not necessary to cover the seeds with soil. River sand or other gritty material (not oyster or shell grit) is just as satisfactory provided it is passed through a fine-mesh sieve. Re-watering immediately after sowing and covering should not be necessary except for large seeds where the boxes were not watered before sowing.

Pre-germination Care

Sheets of glass should be placed over the box to prevent the escape of moisture and on top of this glass a sheet of brown paper should be spread to prevent the entry of brilliant sunlight and to assist in reducing evaporation. The boxes should be placed in a warm, shaded position in the greenhouse or garden frame or in a sheltered position in the open.

The boxes should be inspected daily. The glass should not be turned frequently, for this practice, although advocated by many gardeners, simply removes the moisture and hastens the drying out of the boxes or receptacles. Germination of the seed is detected by the appearance of the cotyledons or "seed" leaves, and immediately this has occurred the brown paper should be removed to prevent the seedlings from becoming "drawn". Within a few days, provided the weather is favourable, the glass also should be removed.

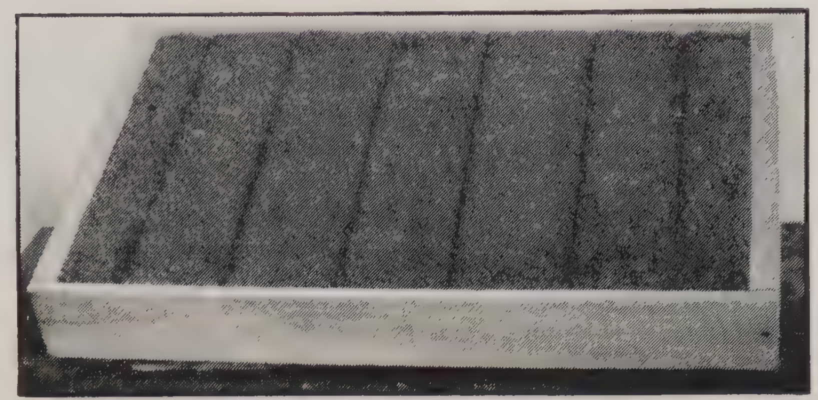
Post-germination Care

Immediately after germination the seedlings will require close attention. If the soil tends to dry out, water should be carefully applied with a can and a fine rose, and in particularly hot weather the seedlings should be protected from the fiercest rays of the sun by being covered with scrim or newspaper, but care should be taken to see that this covering is removed immediately the danger is past. At this stage the "damping-off" fungi *Pythium de Barrianum* and *Rhizoctonia* spp. will possibly strike. These attack seedlings, often severely, at or about ground level. Humid conditions encourage the growth of these diseases and their effect on the seedlings is to cause decay of the stems, usually in a confined region about the bases, so that the plants subsequently topple over and die. Partial control can be effected by the use of Cheshunt compound, which is prepared from copper sulphate and ammonium carbonate finely powdered in the proportions of 2oz. of copper sulphate to 11oz. of ammonium carbonate. These two chemicals should be mixed thoroughly and stored in an airtight jar. To use the mixture 1oz. should be dissolved in a little hot water and added to 2 gallons of cold water. After it is mixed with the water it must be used immediately.

Pricking out

Pricking out is undoubtedly best done at the earliest possible stage, which with the seeds of most annual border plants is the cotyledon or "seed-leaf" stage.

The boxes should be prepared exactly as those used for seed sowing and exactly the same compost should be used. A pattern should be marked out on the surface of the soil to indicate the position into which each seedling is to be pricked out.



A seed box prepared for sowing several varieties in separate drills drawn with a nail. Note the level surface of the soil, ½in. below the edge of the box. A perfectly level surface is essential for uniform watering.

Some hours before pricking out is to be done, or even the day before, the receptacles containing the seedlings should be thoroughly watered to minimise root damage when the seedlings are lifted from the soil.

A dibble or a knife should be used to loosen the soil and the seedlings should be carefully removed from it one by one. The seedlings are best held by one of the seed leaves between the thumb and forefinger. They should never be handled by the stems, as these are exceptionally easily bruised and these bruised areas are the first attacked by fungi.

The dibble, which is simply a short, cone-shaped piece of wood, is used to push a hole in the soil of the pricking-out box. The seedling is lowered into this hole with its roots in a vertical position and with the seed leaf just above the soil surface, and the hole is filled in by pressing the soil gently to the roots with the dibble and forefingers.

As each box is filled it should be watered lightly with a fine rose and placed in a sheltered position until the seedlings have recovered from the shock of transplanting.

After this there is little more to do except to keep a close watch for damping-off or other diseases, to keep the soil moist, and to maintain adequate ventilation about the plants.

Immediately the plants are big enough they should be planted out, for those held in boxes too long tend to become starved and lose their vigour, which they seldom regain under normal conditions.

Garden Work for November

Annuals can still be sown if the soil is not too dry, but late sowings often give uneven germination and poor growth. For late flowering, orange and yellow calendulas should now be sown in boxes, and the seedlings pricked out into other boxes as soon as they can be handled. They may be planted out to the borders early in the new year. Calendulas are moderately resistant to drought conditions, but they should be thoroughly watered during planting out.

Bedding plants, such as nemesias, petunias, marigolds, salvias, asters, stocks, and viscarias, can still be planted out this month. If the soil is dry, it should be watered thoroughly the day before planting takes place, but it is unwise to firm such soil too much for planting in case it should set hard.

Bulb foliage should not be cut off until it turns completely brown, when it is quite useful for the compost heap.

Tulips and daffodils in early districts may be dug up and then put in an airy shed to dry off. Tulip bulbs should never be left in the sunlight, as high temperatures may restrict their development. Tulips should be lifted every year unless they are planted very deeply. Daffodils need to be lifted only every second year.

Chrysanthemum planting should be concluded, even in the latest districts, by setting out well-rooted plants of a variety suitable for border display. The soil should be well dug and enriched with compost or manure before planting.

Dahlias may well be planted out in cold districts where early planting is unwise, and in milder districts late pot tubers may be planted during November to give a colourful display after the main crop has passed. Earlier plantings in mild districts will now be growing strongly and should, if necessary, be thinned by removing a number of the young shoots. These may be removed with a sharp knife, but pulling them away gently with the fingers may be found a better method in that it removes also the lower buds on the stems and prevents further growth from these buds. At later stages staking will be necessary and the stakes should be almost equal in length to the length of the flowering stem, so that the flower when produced is only slightly above the top of the stake. Twine should be used to tie the stems to the stakes so that they are unable to twist about in the wind and break off.

Gladioli, which will now be growing strongly in early districts, should be staked except in gardens where they are very sheltered. Each stake should be pushed into the ground 2in. or 3in. behind the plant and each spike is tied only loosely. Very firm tying may bruise the stems and restrict the growth.

Hedges should be given the first clip of the season as soon as early growth

Dahlias grown for show blooms may need to be fed with weak liquid manure. Feeding plants grown for normal border displays is not necessary, as they should succeed quite well if the soil has been properly prepared.

makes them appear untidy. Provided the clippings are clean, they are a useful addition to the compost heap.

Herbaceous plants producing a large number of shoots can still be thinned by pulling superfluous shoots away, preferably with their roots attached. Where a strong shoot is pulled away with roots attached it may be used for filling a space elsewhere in the border.

Pot-grown fuchsias and heliotropes should be planted into the massed flower border to add interest to the general bedding scheme. They will flower for many weeks during summer.

Shrubs which flower in spring and early summer on shoots produced last season, such as flowering currants, forsythias, and lilacs, should be pruned as soon as flowering has ceased. Shoots which have flowered should be removed to encourage the growth of ample new ones which will produce flowers next spring.

Camellias, hydrangeas, rhododendrons, and azaleas should be mulched during November with well-rotted compost, sawdust, or leaf mould to help conserve moisture and maintain suitable soil conditions. If the soil is dry, it should be watered thoroughly before the mulch is given.

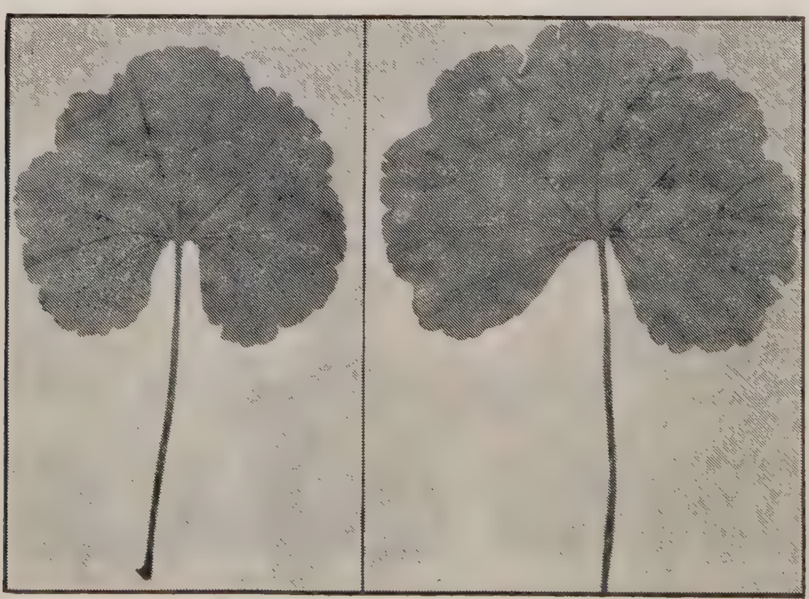
Seasonal Troubles

Geranium rust ruins many geraniums each year by producing rusty brown spots on the foliage. Fortnightly sprayings with 2 fl. oz. of lime sulphur plus ½ fl. oz. of colloidal sulphur to 2 gallons of water will control this disease. Before spraying is begun, affected leaves should be picked off and burnt. Where the geraniums are growing against the house care must be taken with sulphur sprays, as they readily discolour paintwork.

Greenflies will still be prevalent in many gardens and spraying at 10-day intervals with nicotine sulphate should be continued until they have disappeared.

Red spiders attack a wide variety of pot plants and a careful watch should be kept for them from now on. The most efficient control measure against red spiders on pot plants is spraying with summer (white) oil. Where very few plants are to be treated most of the red spiders can be eliminated by holding the plants upside down beneath a fast-running cold-water tap. The treatment should be repeated at frequent intervals until there is no further sign of the pest.

Rhododendrons are often attacked during the summer by thrips which cause the leaves to assume a silvery appearance. The most effective spray against this pest is one prepared by mixing ½ fl. oz. of nicotine sulphate and 3 fl. oz. of summer spraying oil with 2 gallons of water. Nicotine sulphate may be used without the summer spraying oil, but 1oz. of soft soap must be thoroughly mixed with each 2 gallons of the spray to "activate" the nicotine.



Under surfaces of geranium leaves, showing brown pustules of two types of rust.

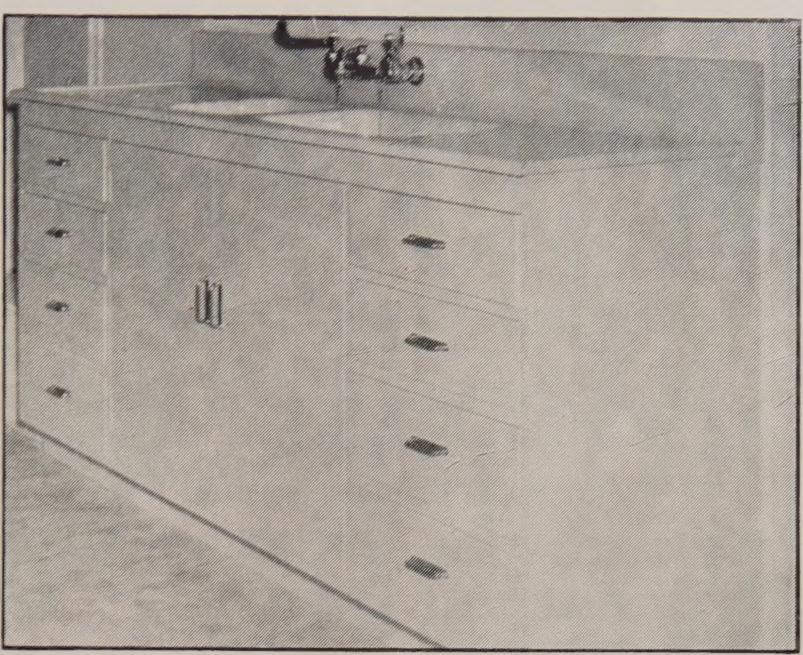
Choosing a Kitchen Sink and Bench

THE kitchen sink is important in the life of every housewife, and washing up may well be considered the most relentless of all household tasks. A good supply of hot water, adequate lighting, and an attractive sink and bench at the right height for the worker will go far to lighten the burden, and in this article Eleanor Couston, Field Officer in Rural Sociology, Department of Agriculture, Timaru, discusses points which should be considered when choosing a sink and bench.

WHEN modernising an old kitchen or planning a new one a feature to which the housewife must give careful consideration is the type of sink and bench surface which will best suit her needs. The amount of time and energy expended at the kitchen sink should be reduced to a minimum, and a check-up on an existing sink to see if it conforms with standards would be well worth while.

Many factors influence the choice of a new sink, one of the most important being the amount of money available for the purpose. It is wise to take the long view and plan for durability, but a gleaming stainless-steel sink and bench is not within the reach of all. With ingenuity and a paint brush a wooden bench and enamel sink can be made a neat and efficient unit. Apart from initial outlay, the cost of care and upkeep is important. The effects of heat, acids, and alkalis on different surfaces vary considerably and the more resistant the surface is the better suited it will be for its purpose. The availability of materials for domestic use, particularly the non-corrosive metals, fluctuates with world demand.

In rural districts, particularly where slow-combustion, heat-storage cookers are installed, it is necessary to have a sink with a capacity large enough to cope with the heavy utensils used. The depth of the sink may vary from 6 to 10in., and there is an increasing preference for the shallower type, which reduces the difference in working height between the bench level and that at which the dishes are washed.


A double sink unit fitted with a swivel-arm tap and a plastic sink and bench with coved back.

Installation of Sink

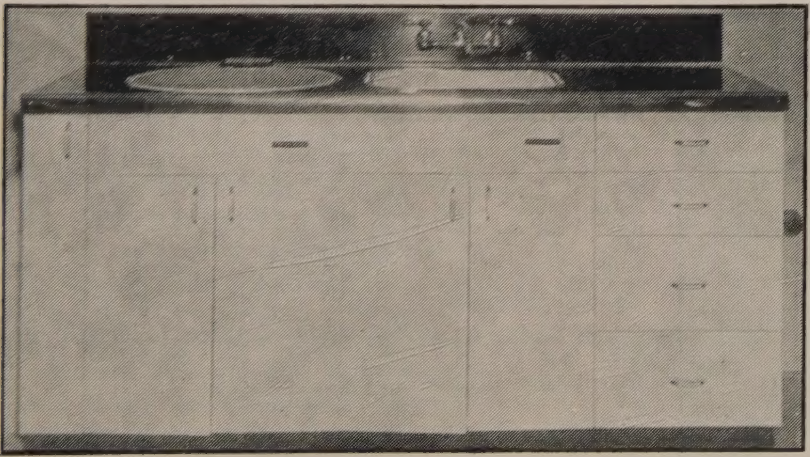
The sink should be installed at the same level as the drain board and not, as is so often done, an inch or more below. The distance between the front edge of the bench and the sink should not exceed 1½in. Adequate bench space at either side of the sink is most desirable, one side for stacking dirty crockery and one for draining. A right-handed person works most efficiently by stacking on the right side and draining on the left of the sink, and the minimum allowance on either side should be about 27in. The width of the bench will vary according to the width of the sink. The draining surface may be plain or grooved and with or without a slight slope toward the sink.

A backsplash must also be considered and preference should be given to one which is a continuation of the surfacing material and having a rounded cove finish at the bench-wall juncture. This makes for easier cleaning than a right-angle join.

Correct working height is an important factor and the careful housewife will see that this height is suited to her requirements. Most handling is done at the half-way level of the sink and for the average-height person this level is 32in. to 33in. from the floor. This means that the bench level will be approximately 36in. Working with a bent back is one of the greatest contributors to fatigue, which can be greatly reduced if all working levels are the correct height.

Other points for consideration are the type and position of the taps, the provision of space for cleaning utensils, adequate foot room, and the utilisation of space under the benches. Care should be taken to ensure that the water will run to the plughole and that there is sufficient space for a bucket to be filled under the taps.

Taps may be either the "pillar" or "bracket" type and should extend far enough over the sink to prevent a flow of water on to the rear edge of the sink but not so far as to be a hazard for chipping crockery. A mixing tap which will regulate the flow of hot and cold water is convenient and where a double-sink unit is installed a swivel-arm tap will serve both sinks.


A sink unit having a synthetic resinous board bench surface, a vitreous enamel sink, a swivel-arm tap, a dishwasher, and a waste-disposal unit.

A double-unit wash-rinse arrangement is considered the ideal for hygiene, but the choice of it depends on the space available and the hot-water supply. Recent research has shown that crockery rinsed in water at a temperature of 180 degrees F. is practically sterilised, and if placed in racks, will dry in the air without being wiped. Apart from the low bacterial count, a great advantage is time saved in drying.

Choice of Material for Sinks

Porcelain enamel is one of the most commonly used materials for sinks and is made by fusing a glass-like surface on a metallic base and treating it with a glaze which will resist acids. It will chip or crack, however, if subjected to extreme changes of temperature, but normal washing temperature will not affect it. Rough abrasives must not be used for cleaning purposes, as these will damage the glaze and make future cleaning difficult. A good variety of colours is available, the price is reasonable, and with proper treatment this type of sink will give long service.

Glazed fireclay: This is a clay product protected by a glaze. It is resistant to food acids and alkalis and to changes of temperature. It will, however, chip or crack with careless usage and once the glaze is chipped the clay, which is porous, will absorb water and become insanitary. This type of sink is not readily available at present and is not in great demand for domestic use.

Because of its cramped space either side of the sink and lack of toe room, this bench makes the washing of dishes difficult.

Stainless steel: Stainless steel is an alloy which is resistant to acids and alkalis. It is extremely durable and a well-constructed sink will give a lifetime of service. Seams should be welded and the corners rounded, the ideal being for sink, bench, and splashboard to be in one piece, thus avoiding unnecessary seams. The price of stainless steel is high, but maintenance is negligible and cleaning is easy.

A possible disadvantage of this material is that there is considerable reflection of light from its surface, and a large expanse of bench may be dazzling in a very sunny kitchen. Some units are available with grooved drain boards and these are desirable where bench space is not restricted, but in the smaller kitchen better use may be made of a smooth-surface bench. A raised rounded moulding to the bench will prevent water from dripping to the floor or wetting the worker.

Monel metal: Another non-corrosive alloy with properties similar to stainless steel, monel metal is also very suitable for sinks and bench surfaces. Unfortunately it is not available at present for domestic purposes.

Plastic: Combined sink and drain boards made from plastic are now on the market in a variety of attractive colours and some models have a small rinsing sink as well. This material is resistant to diluted acid and alkali at normal temperatures. Boiling water will not damage a plastic sink, but superheated utensils such as a saucepan or baking dish direct from the stove should not be placed in contact with it. Water in the sink or a board on the bench would overcome this disadvantage. The type of plastic used for sinks can be cleaned with hot soap and water, but rough abrasives must be avoided. With reasonable care these sinks should prove durable, and although comparatively high in price, are attractive and hygienic.

Bench Surfaces

In the selection of a bench surface there is scope for individual taste, but the utilitarian value of a bench surface must be the primary consideration. The essential qualities of a good bench surface are durability, resistance to stains and to heat, non-absorbency, and ease of cleaning.

Wood: This was formerly almost universally used, but is gradually being replaced by surfaces which are more easily cleaned. Wooden surfaces require scrubbing and are thus time consuming, but have a good appearance if kept scrupulously clean. Unfortunately there is only a limited range of hardwood available. Of the New Zealand woods kauri is probably the best, but well-seasoned rimu (red pine) is also satisfactory.

Painted wood: Heat-proof paint carefully applied will protect a wooden surface and remove the need for scrubbing. A selection can be made from a wide variety of colours and with average wear and tear such surfaces should not require renewing inside a year.

Plastic paint: A new plastic paint is now on the market and has possibilities, but has not been long enough in use to prove its qualities.

Linoleum: Heavy linoleum, if cemented to a good wooden surface with waterproof cement and weighted down until it is dry, makes a very satisfactory bench top. This is, however, a job for a skilled workman, as the linoleum must fit perfectly and be protected at the edges with a moulding. The bench and backsplash should be in one continuous piece with rounded cove from the bench to the wall. The linoleum may be plain or mottled, a light colour generally being preferred. There is reduced possibility of chipping of crockery with a linoleum top than with some of the harder surfaces, but because of its absorbent properties, care must be taken with the use of soaps and it should be dried carefully after use.

Terrazzo: This is a composition of coloured marble set in cement and makes a durable surface, provided no acid is allowed to come in contact with it. Acid will cause pitting and spoil its appearance. A rubber draining mat is recommended for use on a terrazzo surface, as chipping of crockery will readily occur. Terrazzo is in the moderately priced category, is easily cleaned, and is readily available.

Synthetic resinous board: Comparatively new to the market, synthetic resinous board is laminated with an aluminium backing. It combines all the qualities of a good bench surface, being durable and resistant to heat, acids, and alkalis. It is available by the square foot, but a cove-back bench top can be obtained only by buying a made-up unit. This board is laid on a coreboard base and requires a moulding which may be wood, chromium, or stainless steel. It is easily cleaned and there is a good variety of colours and patterns from which to choose. Although expensive when combined with an enamel or stainless-steel sink, it makes a most desirable unit.

The virtues of the non-corrosive metals, stainless steel and monel metal, have already been discussed. Unfortunately they are now available only in limited supplies and at high cost, but perhaps in the future will be within the reach of all. Although initial cost is high, for permanence, resistance to stains, and ease of cleaning a well-constructed stainless-steel sink-bench-backsplash unit is hard to beat.

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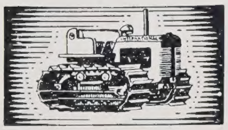

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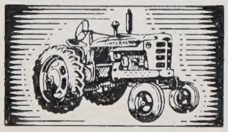

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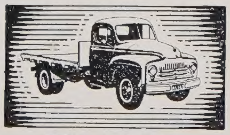

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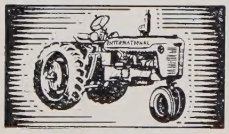

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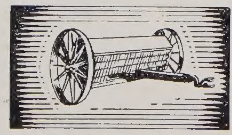

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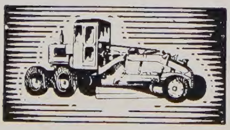

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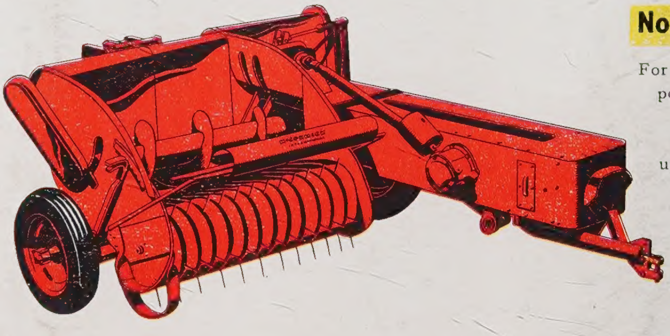

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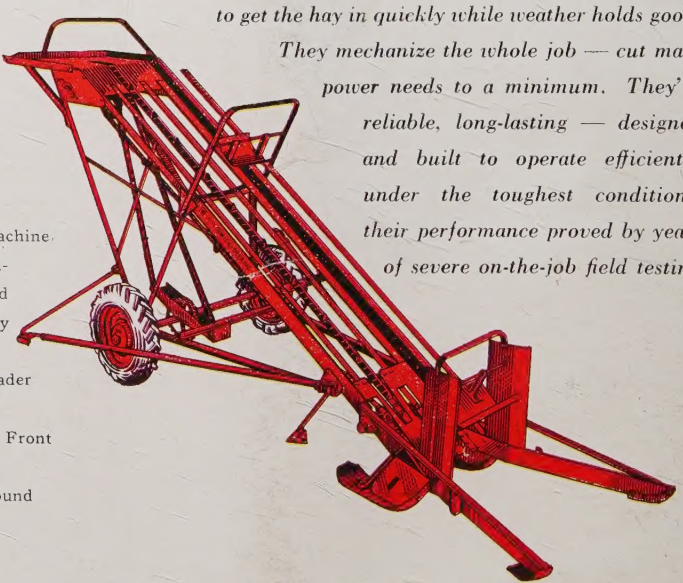

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